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GENTLEMEN whom we know to be reliable and trustworthy are willing to make a liberal proposition to parties willing to join them with a capital of $5000, in putting into shape for active business a concentrating plant, in connection with a mill, in Colorado. Further details may be obtained by addressing H., care of this office.

ELSEWHERE we print the first results of very interesting and suggestive experiments made by Mr. LUTHER WAGONER, C.E., M.E., in which that gentleman endeavors to arrive at a basis for the critical examination of the work of different methods of crushing, with special reference to the production of material possessing uniformity of grain and the making of a minimum of dust or pulp. Mr. WAGONER'S graphic method of comparing results fulfills its object well, though of course the work with ores from different localities is not strictly comparable, as the conditions are not identical. Mr. WAGONER, we understand, is pursuing his work as diligently as the supply of raw material will permit. Those interested in his labors—and every millman should follow them closely—will confer upon him a favor by sending to him samples of the ore coming from their crushing apparatus. In view of the great appreciation which rolls are finding for certain kinds of crushing, it would be particularly desirable that the few who are now crushing ore down to small mesh with this class of machinery should come forward. Mr. WAGONER'S address is No. 318 Pine street, San Francisco, Cal.

THE AMERICAN METAL MARKETS IN 1883.

So far as the three most important metals to American producers—copper, lead, and zinc—are concerned, the history of the year 1883 has been one of discouragement. None of them has escaped the influence of the general depression in manufacturing industries, while some of them have suffered from specially adverse causes. Far from rallying, prices have generally receded, in some cases remarkably so, and, on the whole, the year has been one of disappointment to producers, and to those who are dependent on their prosperity. Meanwhile, the development of our mineral resources has gone on steadily and in a most conservative manner. We have heard less of wild schemes, injudicious expenditure in purchase of mineral property and mining and reduction plant. Some of the crop of bad or improperly conducted enterprises of the preceding years have succumbed, bringing the disgrace of failure, merited so far as the individual enterprises were concerned, upon the industry in general. So far as these happenings discourage the unduly adventurous and the more dangerous class, the swindlers, the process of purification tends to put the mining and reduction of the base metals on a sounder basis. Some of the concerns that have sprung up in late years are struggling along under heavy indebtedness, but are likely to pull through ultimately ; others are practically dead, sad but eloquent proofs of the extravagance, ignorance, and rascality of 1880, 1881, and 1882. So far as the quantity of the metals produced during the year 1883 is concerned, it has been more than satisfactory. The output is distributed over an expanding area, and in the case of copper has proved the ability of American producers to compete under existing circumstances with all the world. In lead and spelter, the situation is far more serious. Restricted to a home market, with no outlets for a production temporarily at least in excess of the requirements of a consumption that has shown no marked increase, the former metal has fallen away under its own weight. Spelter has suffered from a variety of causes, the principal one being a very heavy decline in the consumption, with which a reduction of the make has not kept pace, constantly lagging behind it.

One point in connection with the copper interests deserves discussion and should receive thorough consideration. However opinions may differ on the tariff question—and we are among those who advocate strongly a fair duty to protect an industry struggling into life—we believe that there are few who will be willing to uphold the necessity of the present duty on copper ores and ingot copper. Since we have of necessity become very heavy exporters of copper in all its forms, from the ore to the highest quality of ingot known in the world, the duty has lost all interest to home producers. Its enactment might be allowed to remain a dead letter in our tariff act, if what has been in the past a blessing to producers had not become now a nuisance to very important interests. It hampers seriously the smelting industry of the Atlantic coast. At present, foreign ores and furnace products can be brought into this country, the copper contained being exported under the drawback clauses of the tariff, ten per cent of the duty, however, being retained by the government. Besides this unnecessary duty, which does no one any good and simply adds another drop to the overflowing treasury, the restrictions imposed by the identity features of our drawback system are very troublesome. How injurious the tariff is, will be evident from the following facts. We have it on very good authority that during the current year offers were made to smelters to work thousands of tons of Australian ores, to be sent here as return freight on vessels carrying American manufactures and product to Australia. If our tariff could have admitted their entry free of any payments or restrictions of any kind, there would have been a margin, and work would have come here which now goes to Swansea. At the same time, the trade between this country and Australia would have been facilitated and encouraged, and other industries would have felt the impetus. There is no doubt that, in a similar manner, the shipments of ores and matte from Venezuela and other South American States could be diverted to our smelting-works, which would, as they have already done to some extent, make every effort to introduce American brands, not only

WEEKLY PRICES OF METALS FOR 1883, WITH HIGHEST AND LOWEST PRICES FOR SIX MONTHS. (THE HIGHEST AND LOWEST PRICES IN THE PERIOD OF SIX MONTHS ARE INDICATED BY HEAVIER-FACED FIGURES. ALL PRICES ARE CENTS PER POUND.)

WEEK ENDED.	Copper, ordinary outside brands.	Copper, Lake.	Tin, Straits.	Lead, Com. Dom.	Spelter, Com. Dom.	Antimony, Cookson's.
January 6th	**17·25**	18·00	21·50	**4·70**	4·50	**11·50**
" 13th	17·12	18·00	21·37	4·70	4·50	11·25
" 20th	17·12	**18·12**	21·25	4·60	4·50	11·25
" 27th	16·50	18·00	21·25	4·60	4·62	11·25
February 3d	16·50	18·00	21·00	4·60	4·65	11·12
" 10th	16·50	17·87	21·12	4·50	4·50	11·00
" 17th	15·75	17.87	20·12	4·50	4·50	11·00
" 24th	15·87	17.75	20·87	4·60	4·50	11·00
March 3d	15·75	17.75	20·87	4·55	4.60	11·00
" 10th	15·50	17.62	21·00	4·65	4·62	11·00
" 17th	15·50	17.62	21·75	4·70	4·62	11·00
" 24th	15·25	17.37	**22·12**	4·67	4·75	11·00
" 31st	15·12	17·00	21·67	4·50	4·75	11·00
April 7th	14·90	16·00	21·00	4·40	4·70	10·87
" 14th	14·37	16 00	21·75	4·40	4·70	10·87
" 21st	14·50	15·75	21·00	4·62	**4·80**	10·85
" 28th	14·75	15·87	21·25	4·60	4·75	10·85
May 5th	14·12	15 87	21·25	4·42	4·70	10·75
" 12th	14·25	15·90	21·25	4·40	4·70	10·75
" 19th	14·25	16·00	21·75	4·40	4·70	10·70
" 26th	14·25	16·00	21·50	4·49	4·65	10·65
June 2d	14·12	15·87	21·50	4·40	4·60	10·62
" 9th	**14·00**	15·62	21·37	4·45	4·45	10·75
" 16th	14·00	**15·00**	**20·75**	4·40	4·50	10·62
" 23d	14·00	15·12	20·75	4·42	**4·40**	10·62
" 30th	14·00	15·12	21.50	**4·40**	4·45	**10·50**

WEEK ENDED.	Copper, ordinary outside brands.	Copper, Lake.	Tin, Straits.	Lead, Com. Dom.	Spelter, Com. Dom.	Antimony, Cookson's.
July 7th	**14·00**	15·12	21·50	**4·40**	**4·50**	10·37
" 14th	14·00	15·12	21 00	4·35	4·45	10·37
" 21st	14·00	15·00	21·25	4·30	4·37	**10·25**
" 28th	14·00	15·00	**21·75**	4·25	**4.30**	10·25
August 4th	14·00	15·00	21·50	4·25	4·35	10·25
" 11th	14·12	15·00	21·12	4·25	4·35	10·25
" 18th	14·12	15·00	21·00	4.25	4·35	10·25
" 25th	14·12	15·00	21·00	4·20	4·35	10·25
September 1st	14·12	15·12	21·00	4·30	4·40	10.25
" 8th	14·12	15·12	21.12	4·35	4·50	10·25
" 15th	14·12	15·12	21·00	4·32	4·50	10 25
" 22d	**14.25**	**15·25**	21·00	4·32	4·45	10·25
" 29th	14·25	15·25	21·12	4·30	4·40	10 25
October 6th	14·25	15·25	21 12	4·25	4·35	10·25
" 13th	14·25	15·25	21 00	4·20	4·40	10·25
" 20th.	14·25	15·12	20·87	4·12	4·40	10·25
" 27th	14·25	15·12	20.25	4·20	4 45	10·25
November 3d	14·12	15·00	20·25	4·00	4·40	10·25
" 10th	14·12	**14·87**	20·00	4·00	4·37	10·25
" 17th	14·12	15·00	19·12	3·75	4·37	10·25
" 24th	14·12	15·00	19·25	3·70	4·37	10·50
December 1st	14·12	14·87	19·00	3 70	4·37	11·25
" 8th	14·00	14·87	19·00	**3·60**	4·37	**11·25**
" 15th	14·00	14·87	**18·37**	3·60	4·37	11·12
" 22d	14·00	14·87	.....	3·60	4·37	11·12
" 29th	14·00	15·00	19·00	3·60	4·37	11·25

into the English market, but also into the markets to which it sends its heaviest amounts of crude metal.

Copper.—As in past years, we have again made an effort to attain as closely correct an estimate as possible of the production in the United States, and while we have met with a good deal of encouragement, it is proper to state that we can not claim for our figures any thing beyond their value as an approximation to the truth. It is difficult, almost impossible, to gather full statistics in the short space of two or three weeks in a country in which the sources of supply are so widely scattered, and in some cases are so inaccessible. We have had recourse, so far as it was possible, to the telegraph; but our returns are not as full as they would be if we had had more time at our disposal, and we shall be able in the future to present more accurate data. The estimate which we now submit is considered close enough for all practical purposes of the trade.

The product of the Lake mines, according to preliminary data kindly furnished us, was as follows. We should add that in many cases the smelters returns for December, and in some instances for November, are not yet in. With a number of mines, the output of "mineral" only is available, the quantity of ingot being computed on the assumption that the grade of the mineral will be approximately the same:

PRODUCTION OF COPPER ON LAKE SUPERIOR.

Name of mine.	1883.	1882.	1881.
Calumet & Hecla	33,000,000	32,053,528	31,360,781
Quincy	5,600,000	5,665,796	5,506.848
Osceola	4,260,157	4,176,782	4,179,976
Franklin	4,304,615	3,264,120	2,677,932
Atlantic	2,675,000	2,631,708	2,528,000
Allouez	1,750,000	1,683,557	1,473,007
Pewabic	1,444,770	1,482,666	1,876,244
Central	1,250,000	1,353,597	1,418,465
Grand Portage	740,360	757,080	26,264
Copper Falls	791,276	587,500	669,121
Conglomerate	?	734,249	386,091
Huron	870,085	304,579	254.515
Hancock	?	540,575	571 897
Mass	643,281	737,440	467,684
Phœnix	?	537,177	409,357
Ridge	60,155	102,936	235,606
National	?	17,000	.....
Cliff	.....	66,053	79.382
St. Clair	?	87,126	125,493
Wolverine	300,000	25,623	884
Concord	.....	.....	28,849
Evergreen Bluff	.....	.....	966
Flint Steel	.....	.....	4,140
Belt	?	5,625	.....
Isle Royal	.....	35,447	47,306
Madison	.....	.....	1,534
Minesota	?	10,672	24,237
Minong	?	21,380	15,397
None Such	?	26,450	119,061
Ogima	?	4,207	16,776
Ash Bed	?	72,636	24,804
Centennial	?	82,554	.....
Sheldon & Columbian	?	3,299	10,031
Star	.....	.....	758
Peninsula	600,000	.....	.....
Total	57,690,299	57,155,980	54,540,500
Total estimate for mines sending no returns	1,300,000		
Total	58,990,299		

The Calumet & Hecla produced in 1883 20,624 tons of "mineral," against 19,947 tons in 1882 and 19,542 tons in 1881. The estimate of 33,000,000 ingot is considered by the managers of the company as close as can be obtained at present. The Wolverine produced during the year 427,000 pounds of mineral, the Peninsula 809,000 pounds, and the Grand Portage 892,000 pounds. Our returns, it will be noted, aggregate 57,690,299, and we reach a total estimated production of 59,000,000 pounds by assuming that the Conglomerate, Hancock, Phœnix, National, Cliff, Belt, Minesota, Minong, Ogima, Ash Bed, Centennial, and Sheldon-Columbian, which in 1882 produced 2,143,000 pounds of copper, did not altogether produce more than 1,300,000 pounds in 1883. In placing the product at 59,000,000, we are convinced that we are rather below than above the actual figures, which fuller returns will establish. Adopting that figure, we have—

PRODUCTION OF COPPER IN THE UNITED STATES.

	1883. (Estimated.)	1882. (U. S. Geological Survey.)
Michigan	59,000,000	57,955,980*
Montana	24,500,000	9,058,284
Arizona	24,450,000	17,984,415
Colorado	1,550,000	1,494,000
Wyoming	950,000	100,000
California	750,000	826,695
New Mexico	1,115,000	869,498
Utah	557,875	605,880
Vermont	800,000	1,265,000
Nevada	300,000	350,000
Missouri	260,306	294,695
Eastern and Southern States	500,000	690,000
Miscellaneous	125,000	125,000
Imported pyrites	2,000,000	1,000,000
	116,658,181	91,819,447

Roughly, we estimate the production therefore at 117,000,000 pounds of copper. Montana includes the product of the Bell, the Montana Copper Company, the Parrott, the Colorado & Montana smelter, the Anaconda, and scattered output of works like the Hecla. We have no direct return from the Anaconda mine. The Butte *Miner* prints the statement that the Anaconda shipped 24,320 tons; the Liquidator, 2025 tons; and other mines, 6983 tons—a total of 33,328 tons. If any such quantity has been shipped, we are at a loss to discover where it has gone to. Our exports of ore were in ten months 8591 tons, and for the entire year can not have been more than 10,000 tons. This tallies pretty closely with the English returns, which put the receipts of fine copper in American ores at about 5000 tons net. Allowing for the fact that the quantity in transit in November and December, 1883, was undoubtedly larger than in the corresponding months of the last year, and taking into account that part of the copper in ore is accounted for in the figures of the Montana Copper Company, we feel convinced that we are not far from the truth when we put down the Anaconda and other mines shipping ore only at 10,000,000 pounds of copper.

Our figures from Arizona include the following producers: Copper Queen, Old Dominion, Detroit, Arizona Copper Company, Cochise, United Verde, Copper Prince, Columbia, Takoma, Long Island, and Copper Mountain, the aggregate being somewhat larger than expected. A number of Arizona companies which figure in the list of producers have shut down; but on the other hand, some of the large companies, notably the Arizona Copper Company, have done comparatively little, though preparing for future work on a large scale. From the aggregate Colorado product, we have deducted the quantity of matte sent there from Montana and Utah. In Vermont, the Ely mine has worked eight months in the year. In Nevada, the Ludwig Copper Company, at Gold Hill, and the Nashville Copper Company have been working; while in New Mexico, the Santa Rita has turned out some concentrates and the Valverde some black copper. The metal credited to Wyoming comes from Fairbanks, and that of Missouri from the Ste. Genevieve mines, the copper produced being reported to be of very good quality.

The copper from the imported pyrites, which is all re-exported, comes from the Capelton mines in Canada, which have sent from 30,000 to 40,000 tons, and from the residue of the Spanish pyrites treated at the New Jersey Extraction Works. The Arminius mines, in Virginia, have also produced some cupriferous ore.

So far as the future is concerned, we do not look to any material reduction in the output. The mines have stood the test of low prices, the weaker ones have practically succumbed, while the stronger companies are compensating for lower returns by a heavier output.

* Commissioner of Mineral Statistics of Michigan.

According to the figures published by the Bureau of Statistics, the exports of copper for the first ten months of the year have been :

	1883.	1882.	1883.	1882.
Ore, tons	8,591	1,977	$1,494,532	$153,212
Ingots, bars, old and sheets, pounds	15,840,756	2,909,655	2,413,665	552,090

These figures, we presume, do not include the metal produced from foreign ores, and exported under the drawback system. The export of Lake copper is estimated by good authorities to have been at least 12,000,000 pounds, while the exports of Arizona, Colorado, Wyoming, Nevada, and other bar must have been at least 6,000,000 pounds—a quantity which we are fully able to account for from the known movement of the products of a number of the largest mines. Besides this, of course, the entire product of the Anaconda went abroad, as also that of the Bell and of the Mountain Copper Company. The bulk of the metal produced from imported pyrites was also shipped, so that the total export was not less than from 38 to 40 millions of pounds of copper, leaving for home consumption approximately 79,000,000 pounds. This we believe the consumptive demand has very nearly coped with.

The first half of the year 1883 was one of considerable excitement in the copper trade. It was characterized by a long struggle between the Lake producers and the Western mines, which ended in the full recognition of the latter as an important element. Those who had so long controlled the markets in this country tried in turn every device which had in past years maintained values, but without success. The year opened with Lake at 18 cents nominally, and other brands held at 17·25 cents, and the price named appeared destined to become the ruling figure for months to come, as consumers came forward taking about twelve millions of pounds of Lake copper at 18 cents. January and more still February witnessed, however, a wild scramble on the part of Western producers to place their copper, and with the leading consumers fairly supplied, it was possible only by concessions. In some instances, the exigencies of the smaller Arizona and Montana works forced them, in order to cover advances by bankers, to sacrifice their copper. The gap between the quotations of Lake and other brands widened more and more, and proved so tempting to those who had purchased the dearer copper that they began to use the cheaper metal, selling in the open market corresponding quantities of the Lake delivered to them on their contracts. Little lots of Lake were continually coming on the market, pressing down quotations, and in turn reacting on other brands. In the middle of March, the Lake companies resorted to an export sale of fully 10,000,000 pounds at 16 cents, and appeared to be so sure of their position that they declined further orders aggregating 6,000,000 pounds at 15·75 cents. In spite of this, the decline continued. At a meeting of the manufacturers, considerable quantities of the best outside brands were placed, and hence, in the beginning of April, the Lake companies took a sudden turn, offering copper freely at 16 cents, and yet the market weakened. In May, sellers and buyers were maneuvering for position, and the market rallied slightly, in spite of the fact that the spring trade had proved a disappointment. There was little Lake copper in second hands, manufacturers having pretty well exhausted their supplies. First hands held firmly, until in the first weeks of June from 18 to 20 millions of pounds were placed with consumers at 15 cents, the sellers binding themselves not to offer any copper to the home trade at less than 16 cents before the first of November, but reserving to themselves the right to sell at any figure for export orders. The other brands had meanwhile steadily followed in the decline. The summer months were exceedingly dull, and it was not until October that the Lake contracts with consumers were extended at the old figure, 15 cents. The pressure of outside grades gradually slackened, and toward the end of the year an actual scarcity of raw material made it difficult for the refiners to make their deliveries in some cases. In November, it leaked out that the Lake contracts had been extended to cover the winter and spring requirements till the beginning of May, the quantity involved being 20,000,000 pounds.

Copper Abroad.—We have during the year insisted again and again upon the dependence, in a very material degree, of our own market on that of England. We may temporarily move independently of it, but must ultimately follow its general fluctuations. The time when Europe was the dumping-ground of our surplus stocks has passed by. Any important rise here, accompanied with a corresponding upward movement of values abroad, simply means the diversion of a part of the quantity of metal which must be exported to the home market, while an independent drop here forces heavier export shipments. To some extent, the special quality of some classes of copper permits it a certain latitude ; but the experience of the last two years has too strikingly proved that there is a well-defined limit beyond which it is unsafe to go.

On the other hand, our own production is beginning to play an important part in shaping the markets of the world, and it is a fact generally acknowledged by the best authorities in England that the heavy quantities sent by us have been instrumental in forcing values downward in Europe this year.

From a valuable annual report of Messrs. James Lewis & Son, of Liverpool, we take the fellowing average prices during the year :

AVERAGE PRICES FOR THE MONTH.

	Good ordinary brands.	Ore, 20 per cent.	Precipitate.
January	£66 5s. 6d.	13s. 2d.	13s. 6½d.
February	65 8 9	13 0	13 5⅛
March	65 13 8	13 2	13 5½
April	65 13 11	12 6	12 11⅛
May	62 9 2	12 2	12 7¾
June	64 0 2	12 5	13 0
July	63 17 9	12 4½	12 11⅛
August	63 16 0	12 4½	12 9
September	63 12 3	12 4½	12 8¾
October	61 17 6	12 0	12 6¾
November	60 8 6	11 6	12 5⅛
December	58 6 6	11 2	12 0⅝
Average, 1883	63 5 10	12 4½	12 10 9-16
" 1882	66 17 0	13 6¾	13 10 1-6
" 1881	61 10 0	12 6	12 8 3-16
" 1880	62 10 0	12 9	12 11
" 1879	58 5 0	11 6½	

The statistical position in England is best shown by the following Board of Trade returns of imports and exports, estimated in gross tons of fine copper :

Imports.	1880.	1881.	1882.	1883.	
Ores, Chili	275	77	72	212	
Cape	4,739	3,467	5,716	5,975	
American	.....	.....	.....	4,940	
Other countries	8,268	9,070	8,385	7,510	
	13,282	12,614	14,173	18,637	
Regulus, Chili	6,597	3,652	4,897	2,873	
" Other countries	2,036	2,839	4,372	6,079	
Precipitate, Spain and Portugal	16,796	19,364	18,655	24,592	
Bars, ingots, etc., Chili	24,258	21,019	22,585	22,799	
" Australia	9,406	9,150	8,152	9,531	
" Other countries	2,845	2,001	4,772	3,323	
Pyrites	16,447	13,551	15,673	15,017	
	91,667	84,190	93,279	102,851	
Exports.					
English, wrought and unwrought	31,783	34,698	28,475	32,848	
Yellow metal	10,129	9,040	10,892	11,918	
Brass	2,678	3,264	3,499	3,382	
Foreign, unwrought	14,895	13,790	12,818	11,203	
	59,485	61,692	55,684	59,351	
Difference	32,182	22,498	37,595	43,500	

Messrs James Lewis & Son have compiled the following figures, estimating the stocks and apparent home consumption in Great Britain and France :

	1880.	1881.	1882.	1883.
Stocks of copper of all kinds in England at the end of the year were	41,395	35,306	32,623	36,803
Apparent home consumption of foreign copper	29,891	28,587	40,278	39,320
Production of Cornish mines	2,754	2,583	2,526	2,404
British ores sold at Swansea	234	435	73	65
Apparent home consumption of copper	32,879	31,607	42,877	41,789
Stocks of copper of all kinds in France were	6,462	3,437	2,504	3,040
Import of copper of all kinds into France directly	11,818	16,476	13,573	20,894
Apparent French consumption (exclusive of import from England)	9,956	19,461	14,506	20,358
Apparent French consumption (including import of English copper)	15,792	27,270	21,528	26,435
Total English and French consumption of English copper and English export	102,320	112,760	113,067	121,498

The most striking points in these tables are, first, the heavy increase in the quantities of copper from American ores, exclusively the product of Montana mines, the falling off in Chili regulus, fully compensated by the increase in the receipts of American mattes, and the very large increase in Spanish and Portuguese precipitate.

The movement of Chili produce is shown in the following table, in tons of fine copper :

	Total export from Chili.	Import into England.	Import into France.
1876	50,912	36,742	12,198
1877	45,562	38,544	8,985
1878	46,931	37,990	9,078
1879	49,560	41,137	5,727
1880	43,135	33,198	11,498
1881	38,160	27,357	13,231
1882	43,129	30,112	12,194
1883	40,500	27,504	16,064

In all, 20,894 tons of copper were imported into France directly. Of this, it is shown 16,064 tons were Chili copper, while probably a large proportion of the balance is Lake copper, for which France is a good customer. Recently, however, a French smelting establishment has also appeared as a purchaser of mattes in our markets.

Spain has shown a heavy increase, the official exports for the first ten months of the year, in metric tons being :

EXPORTS FROM SPAIN FOR TEN MONTHS.

1881.	1882.	1883.
14,260	17,897	19,555

As for the future of the copper market abroad, we can not do better than to quote the following paragraph from the report of Messrs. James Lewis & Son. So far as it refers to the condition of affairs here, we are not fully in accord with them :

"The future value of copper mainly depends upon the quantity shipped from the United States to Europe. It is stated that the supplies from Montana will this year largely exceed those of last year ; but whether this will really prove the case or not, we can not at present say. In Arizona, we are led to believe, the production will not be much greater than during the past year. On the other hand, the great decline in values in the United States—much greater than here—may possibly affect the production of the Lake Superior mines. The quantity of copper shipped from Spain will doubtless further increase, especially in the form of precipitate, to compensate for the prospective reduced value of the sulphur in the pyrites, and also of the copper. The war being now ended in Peru, we may look for larger supplies from that country ; but if values continue at their present level, we doubt if Chili will produce as much as heretofore. On the poorer class of ores raised in Newfoundland, Central America, Italy, Norway, and elsewhere, a lower range of prices will doubtless cause a diminution of production. Large quantities of Australian copper are now shipped directly to India.

"Consumption, we fear, will not be on the same scale the next twelve months as during the past. The prospects of trade in the United Kingdom, France, and the United States during 1884 are at present very gloomy. In the latter country, railroad building has received a severe check and is almost at a stand-still ; while the shrinkage in the value of investments of all kinds has been enormous. In France, the unsatisfactory state of politics causes a very uneasy feeling, and seriously interferes with business. In England and Scotland, the depression in the value of steamers causes an almost entire absence of orders for new vessels, and workmen are discharged in large numbers from the various shipbuilding yards. The effects of this may be judged from the fact that during the past three years over 2000 steamers, representing upward of three millions of tons, have been launched, and that in their machinery and fittings large quantities of copper are used. Manufacturers in Birmingham complain of the dearth of fresh orders, and only buy for their immediate requirements. The value of the steam-engines, machinery and mill work exported in 1883 was £13,443,584, against £11,932,247 in 1882, £9,960,206 in 1881, and £9,263,516 in 1880."

NEW PUBLICATIONS.

GEOLOGY OF THE COMSTOCK LODE AND THE WASHOE DISTRICT. *With Atlas.* By GEORGE F. BECKER. (*United States Geological Survey.* CLARENCE KING, *Director.*) Washington. 1882. Quarto, 422 pages. (*Index.*)

"By the time the Comstock has been entirely worked out," observed a mining captain in our hearing, "these geological fellows will begin to know what sort of a lode it is." Exactly so; the Comstock, by reason of its great size and the great depth to which it has been exploited, offers a field for the study of vein-phenomena on a vast scale; but (and this is no reproach to scientists) the explorations of the miner were necessary before the geologist or mineralogist could obtain the data for his study. Smaller veins offered no precedents upon which scientific prophecies could be based. It is quite likely that the Comstock mines will do more for science than science has done or ever can do for them. That is to say, the careful study of these extensive workings may reveal facts and laws, too late to guide the miner in this locality, but not too late to be of service elsewhere. Hence we welcome the appearance of another elaborate treatise, to be added to the works of Richthofen, King, and Church.

Mr. Becker has reviewed the labors of his predecessors, and, with the advantage of later light, and, in some respects, more detailed investigation, has come to somewhat different conclusions. From the pages of his report, we miss the "propylite," which had become a household word even among the common miners, but which, as he explains, was erroneously applied to a number of Tertiary and pre-Tertiary rocks, reduced by decomposition to a nearly uniform appearance. Even the supposed propylites from other parts of the country are pronounced to constitute no independent species. The supposed trachyte of Washoe, Mr. Becker declares to be a hornblende—andesite. The hanging-wall of the lode is mainly diabase; the "black dike" is also a variety of diabase. "Rhyolite," too, is gone, "quartz-porphyry" having taken its place. Mount Davidson is composed, not of syenite, but (as Zirkel has shown by microscopic examination) of granitoid diorite. Thus nearly all the old geological nomenclature of the district is swept away. Some of Mr. Becker's determinations may be open to further question; but the probability is, that they will find general acceptance, and will constitute the basis of future studies in the lithology of this interesting region. Mr. Becker has wisely given much space to this part of his treatise, and has furnished, with his conclusions, a full statement of the evidence on which they are founded.

The similarity between the form of the west wall of the Comstock and the face of the adjoining Virginia range has been considered, by King and others, an evidence that the wall is a continuation of the exposed surface of Mount Davidson; but King more recently changed his view on this point, and Mr. Becker adopts and enforces the opinion of Richthofen and others that the wall is that of a fault. In this connection, he enters upon a highly ingenious and delicate piece of mathematical analysis, going to prove that, if a fault results in the division of the rock-masses into more or less distinct plates, parallel with the fault, and the movement of these plates by friction on their contact planes, and if the original surface was level, or regular, within certain limits, and if the surface left after the fault was not, still later, altered considerably by erosion, then the line in said faulted surface made by its intersection with a plane at right angles to the fault should be a logarithmic curve. Accepting the mathematical calculation, we must observe that it is by no means easy to find in practice the conditions—or rather, to demonstrate that we have found the conditions—which it premises. But Mr. Becker thinks the neighborhood in question presents them. He says (page 157):

"The most striking and wide-spread evidence of the faulting is the apparent relative movement of the contact-surfaces between more or less regular sheets of the east and west country-rocks for a long distance in both directions from the lode. Each sheet appears to have risen relatively to its eastern neighbor, and to have sunk as compared with the sheet adjoining it on the west."

We quote further (page 165) the description of an experimental verification, which may help the reader to understand the nature of the theory, to which, we ought to say, our brief statement is scarcely fair:

"If a pile of, say, one hundred slips of very thin, flexible, and uniform paper, eight or ten inches long, with sharply cut edges, are laid upon a flat surface, and a narrow weight of three or four pounds is placed across them, the pressure under the weight may be considered as constant. In the experiments I have made, the weight employed was about 5000 times as great as that of a single slip. If a blunt edge, such as that of a ruler, be now applied at right angles to the longer dimension of the slips, close to the weight, with a light pressure, and be drawn away from the weight a fraction of an inch, a slight relative movement will be perceptible. If this application of energy to the system be repeated a score of times, the ends of the pile of slips will be found to form a curved surface instead of a plane."

The curve thus obtained Mr. Becker declares to approximate the simple logarithmic curve. Now, he thinks he can discover such a curve in the section of the surface on the line of the Sutro tunnel; and this is one of his grounds for referring the sheeted structure of the region to faulting, and not to eruptive bedding. In other words, lateral pressure and friction have, in his opinion, given that structure to the eruptive masses—the phenomenon being rather a series of parallel faults than a single fault in the ordinary sense.

The whole of this ingenious discussion is perhaps open to the objection that it deals too delicately with data which in practice do not permit or deserve such precision. If this objection is well-founded, then Mr. Becker's deductions, in the way of rules for the guidance of proprietors, etc., are not likely to prove practically useful. We can not but appreciate thankfully, nevertheless, the contribution of any observations and generalizations to a subject so meagerly supplied with them; and we shall be rejoiced if it turns out both that Mr. Becker is right as to the Comstock, and that the Comstock is not so exceptional in its phenomena as to preclude the application of his theories elsewhere.

To Church's hypothesis that the heat of the lode is due to kaolinization, this volume furnishes strong opposing arguments. According to Mr. Becker, there is extremely little kaolinization at Washoe, the feldspars having yielded to another kind of decomposition. Experiments seem to show that kaolinization, at least when occurring at the boiling-point of water, has no heating effect perceptible by most delicate instrumental aid. Finally, there is geological evidence pointing to a deep-seated source of heat; and this is confirmed by extensive temperature observations, showing a uniform increase of about one degree Fahr. for each 33 feet in depth, and, horizontally, a decrease of heat in geometrical ratio to the distance from the lode.

As regards the deposition of ore in the Comstock, Mr. Becker evidently favors the lateral secretion theory, recently revived with so much ability by Professor Sandberger, in Germany. He says:

"With a view to testing the possibilities of this theory with reference to the Comstock, the rocks of the district have been assayed with all possible precaution. The principal rocks containing precious metals were also separated by Thoulet's method, and the precious metals traced to their mineralogical source."

The latter, by the way, is the only method by which the theory of Sandberger can be tested. In his work on the subject, that investigator protests against *Bauschanalysen*, or assays and analyses of rocks in mass, and not of their separate minerals, as a means of ascertaining whether they may have been the sources of ore-supply. Mr. Becker found, among the results of his inquiry, that

"The diabase shows a noteworthy contents in the precious metals, most of which is found in the augite; the decomposed diabase contains about half as much of these metals as the fresh rock; the relative quantities of gold and silver in the fresh and decomposed diabase correspond fairly with the known composition of the Comstock bullion; and the quantity of precious metals which has been leached out of the diabase is comparable with that which the lode must have contained at its discovery."

Elsewhere we find the comparison last referred to. Estimating the extent of diabase exposed to the depth of 2500 feet in the lode at a length of 8000 feet and a thickness of 2500 feet, Mr. Becker says that 13 cents per ton, or one cent per cubic foot, extracted from this mass, would give $500,000,000. Now, over $300,000,000 have been produced by the mines, nearly $100,000,000 have been lost in tailings, and the other hundred million, at least, are contained in the low-grade quartz. A calculation of this sort is valuable only as showing that the hypothesis of lateral secretion is not physically absurd from its inadequacy to account for the amount of metal found in the vein.

The assays of rocks to which this calculation refers are not as numerous or as precise as we should like to see in a matter of such importance. Less than forty in all; only a dozen of them made on the diabase in question; and these all cupel-assays, by which differences of ten cents and less in bullion value per ton are determined—this is "drawing it too fine." Even though Mr. Curtis, the assayer, succeeded in making litharge that contained but eight cents' worth of silver per ton, we feel afraid to follow him when he reports such values as $0.03, $0.05, etc., as he does in many instances. Nevertheless, the figures have qualitative value; and while the theory of lateral secretion is not demonstrated for the Comstock, certainly the case in its favor is not to be despised.

As the result of many lines of inquiry, Mr. Becker, who certainly shows no hesitation in accepting the logical results of his views, propounds the history of the lode, substantially as follows: He says that after the eruption of diorite, came its rupture and dislocation by the diabase, leaving a smooth contact between them, dipping about 45 degrees. This was afterward slightly opened to admit the younger diabase or "black dike." Then came eruptions of andesite, not important to the lode; and then erosion, reducing the surface to a gently sloping plain. A great movement followed, after the dry period had set in for this locality—a movement either of the foot-wall up, or (less probably) of the hanging-wall down, having its center of action near Mount Davidson, and involving enormous friction, the formation of parallel sheets in both wall-rocks, and of innumerable cracks in these sheets. The upper edge of the east (hanging-wall) country broke off in a wedge or "horse." Various spaces and clefts were formed and left open. Floods of heated waters now rose from a depth of two or more miles, following the main fissure, and penetrating and decomposing the east country. Silica and metallic salts were set free from the mineral constituents of the rock by the action of carbonic and sulfhydric acids, and possibly other active reagents contained in the waters, and were redeposited in the open spaces in and near the main fissure.

Mr. Becker ascribes the waters now found on the lode to the Sierra Nevada as a source, and believes that they are heated by volcanic heat *en route*. Concerning the future exploration of the lode, he declares that depth *per se* is not discouraging, except as it renders exploration more expensive; that the western limit of the diabase is the only ground in which important bodies of ore have been or will be found, and that exploration should be confined to the neighborhood of this contact. He thinks the country northeast of the *Ophir* particularly favorable, as containing a good deal of unexplored contact between diabase and diorite, adjoining a region of broken and highly altered rock. Also, there is hope for the mines near the *Union* shaft, and some chance of hope for *Best & Belcher*. On the whole, the report is not likely to stop any mines which are now prospecting.

A chapter devoted to the electrical activity of ore-bodies reports "electrical surveys" on the Comstock and at Eureka. In the former case, nothing was obtained in the way of valuable results; but at Eureka, "a distinct though small difference of potential occurs near ore-bodies, and with sufficiently delicate apparatus, the method might there be used for prospecting." This sounds like the verdict of the experimenters in the same line, in Germany, a quarter of a century ago; and we suspect it will come to the same ultimate fate—nothing at all.

We have but imperfectly noticed the contents of this extremely original and suggestive report; but space is wanting for further comment at present. We will say in conclusion that the Atlas is very handsome (a good deal like that of King); that the typography of the report is good (except as to the whim of the author, of putting the words *Comstock* and *lode* and *district* in startling capitals wherever they occur—a piece of very poor taste); and that we have noticed but one serious typographical error, to wit, on page 158, where Reuleaux's *Kinematics* is referred to as *Pneumatics*.

ABSTRACT OF REPORT ON THE GEOLOGY OF THE EUREKA DISTRICT, NEVADA. By ARNOLD HAGUE. [*Extract from the Annual Report of the Director of the U. S. Geological Survey*, 1881-82.] Washington. 1883. Quarto, 50 pages.

The territory to which this abstract refers is about twenty miles square and lies partly in White Pine and partly in Eureka County, Nevada. It contains several mining districts, the best known being the Eureka District, which has produced during the past fifteen years more than $50,000,000 in silver and lead. The report before us, however, has little or nothing to say of the mines or the ore-deposits. It is devoted to the

geology of this interesting region, which combines an extraordinary range in its section of stratified rocks with widespread evidences of volcanic activity. Both its lithology and its stratigraphy are therefore worthy of such a careful study as these pages indicate.

The Palæozoic section of Eureka comprises 30,000 feet, as follows: Cambrian, 7700 feet; Silurian, 5000 feet; Devonian, 8000 feet; and Carboniferous, 9300 feet. It is nearly at the bottom of this section, namely, in the Prospect Mountain limestone and along its contact with the underlying Prospect Mountain quartzite, the lowest of the Cambrian rocks of the district, that the famous ore-deposits of the Eureka District occur.

Later than the Carboniferous (here represented by quartzite, sandstone, conglomerate, and limestones only), this mountain area presents no sedimentary rocks except the Quaternary formations of the valleys. But the Palæozoic section above mentioned, containing but one plane of unconformity (in the Silurian), and offering in exceptional abundance the means, in the form of characteristic fossils, for determining the age of the different members, is a wonderful series, and is likely, now that it has been carefully studied and made known by Mr. Hague, to become the standard section of the Great Basin. It is approached but not surpassed in range and completeness by the Wahsatch section reported by Clarence King in Utah. That is also 30,000 feet in hight, but it is conformable throughout, and ranged from the Cambrian through the Permian, thus reaching into the Mesozoic. In that section, the Cambrian rocks have a development of 12,000 feet, against 7700 feet at Eureka, or rather, as Mr. Hague says, the 12,000 feet of the Wahsatch Cambrian are mostly below the Eureka Cambrian altogether, and the latter series is almost wanting in the former section. (By a typographical error, the Carboniferous of the Wahsatch section is here set down as 1400 feet. It should evidently be 14,000.) A third section, from the Kanab Valley of the Lower Colorado in Arizona, is given by Mr. Hague, on the authority of Mr. C. D. Walcott, for purposes of comparison. The report contains also an account of the igneous and volcanic rocks, originating before, during, and after the Tertiary period in this district. A colored geological map, on the scale of 1 : 86,400 (7200 feet to the inch), and several sections, illustrate the text. Judging from this abstract, we credit Mr. Hague and his assistants with a piece of difficult and important work, well done.

THE FORMATION OF SULPHURIC ACID IN THE LEAD CHAMBERS.

Professor G. Lunge, the great authority on the manufacture of sulphuric acid, has read a paper before the Helvetic Society on the formation of sulphuric acid in the lead chambers, basing his conclusions upon results obtained by M. Naef, of the Metiken Works. His conclusions are the following:

1. In the ordinary course of working, no hyponitric acid exists in the lead chambers. This acid takes no part in the formation of sulphuric acid. It arises merely as a secondary product, and under quite peculiar circumstances.

2. In presence of a large excess of nitrous gases, the formation of N_2O_4 takes place in the last chamber, and in this there is very little sulphuric acid produced. It seems very probable that the absence or the reflux of sulphurous acid is of great importance for the production of N_2O_4.

3. The quantity of oxygen contained in the gas of the chambers has little influence on the formation of N_2O_4.

4. If the gaseous current in the chambers is yellow, the loss in N_2O_3 and N_2O_4 in the Gay-Lussac tower is of a certain importance, and under ordinary circumstances may rise to 60 per cent of the total loss.

5. If the gaseous current is colorless, the loss in nitrate in the Gay-Lussac tower is equal to 0·5 per cent of niter, or to 20 per cent of the entire loss. The gases which escape contain mere traces of N_2O_3 and N_2O_4, but, instead, NO and SO_2.

6. We never find N_2O_4 in the tower acid, even when the gases of the chambers and the escaping gases contain it.

7. During the transformation of SO_2 into H_2SO_4 there occurs an anomaly which is not without interest. As far as to the center of the first chamber, 75 per cent of the total quantity of sulphurous anhydride are transformed into sulphuric acid; from there to the end of the chamber, only 4 per cent more of SO_2 are converted. The total quantity of SO_2 is further lessened by 10 per cent after the gases have traversed the connecting pipe between the first and the second chamber. The employment of a system of several chambers is very favorable to the good working of the plant; for in passing from one chamber to another, the gases undergo a slight compression in the pipes, and are mixed in an intimate manner.

8. In the center of the first chamber, the mixture of gases is almost complete. The composition of the gaseous mixture is the same at different hights. At the center, there is from 0·1 to 0·2 per cent more SO_2 than along the sides.

9. It is improbable that the gases which penetrate into the chambers rise at first, and afterward slowly redescend. They become quickly mixed already in the anterior portion of the first chamber.

10. The progresss of the temperature in an entire system of chambers is very regular. In the first fourth part of the first chamber, where the chemical reactions are very intense, the temperature of the gases rises about 5 degrees to 6 degrees, and then falls slowly. Toward the end of the series of chambers, the fall of temperature is a little stronger.

11. On increasing the cubic measurement of the chambers from 1·5 to 1·8 meters per 3 kilos. of sulphur burnt in the first two chambers, there is observed a decrease of temperature of from 9 degrees to 10 degrees, and in the third of from 5 degrees to 6 degrees.

12. The reduction of temperature by the sides of the chambers is scarcely perceptible in the interior beyond the distance of 25 centimeters from the side, the ambient temperature being 19 degrees. At from 5 to 10 centimeters from the side, the reduction of temperature is 2 degrees, and at from 10 to 25 centimeters only 1 degree. From the distance of 25 centimeters from the wall to the middle of the chamber, the difference of temperature is 5 degrees, and from the side to the center 8 degrees.

13. In the middle of the first chamber, the temperature is lower by 5 degrees at the bottom than at the top.

14. The use of the atomized water instead of steam has no great influence upon the temperature of the chambers.

MINING IN CANADA—SULPHUR ORES AND PHOSPHATE.

Written for the Engineering and Mining Journal.

Time works marvels in the lives and interests of individual citizens, but much more so in the history of manufactures and of states. We live on the eve of great changes, and the wisest among us, not blinded by political bias, can see that the probable reform of the tariff in the near future must bring with it certain radical alterations in our manufactures and commerce. Whether serious changes in the trade of the two countries occur or not, there are raw materials in Canada which are now valuable, and will speedily become more so as our consumption of sulphuric acid and fertilizers increases. Except coal, sulphur ores, and phosphates, the minerals of Canada possess but little interest for the American investor. Now and then, he may meet with something worth notice in other directions, but not often. In the case of sulphur ores and phosphate, it is not so; for outside of our Carolina supplies of phosphate, there is none so near or so rich as the apatite of Canada, while our available sulphur ores are widely distributed.

It is not many years ago since Canada phosphate began to attract notice in the United States and Europe. Of late years, Americans have kept a steady lookout for property in Canada which they could work themselves for the requirements of their own factories. The importance of the fertilizer trade in its present condition, and the proportions it promises to assume in the near future, are the principal causes of this diversion of interest. It is not many years ago that the home manufacture was expressed in five figures; now it takes seven. This change has been accomplished in the short space of ten years. What it will be in the next decade will depend mainly on the supply of the raw material, and especially on the cost of the sulphuric acid. When Canada apatite first came on the market, some eight years ago, practical men shook their heads at the hard and unpromising looking material. Many of the mills then in use in fertilizer-works were the buhrstones used to pulverize coprolite and other comparatively soft material. The difficulty of grinding has now been overcome, and it is no longer a source of danger to workmen and of perplexity to manufacturers. Instead of using it as they did coprolite, it is mixed largely with other softer materials, which enables the operating chemist to first saturate the apatite with sulphuric acid, and use Carolina phosphate or bone-ash as a drier. The use of these materials assists largely in lengthening the chemical action of decomposition; the carbonic acid of the softer materials offers a mechanical agent to sustain the acid in its attack on the hard and crystalline apatite. Up to the close of June, 1881, the total export of Canada phosphate was 15,600 tons, the average value of which was about $16 a ton. In 1882, these figures were increased to 18,000 tons, which commanded a higher average of value. Last year, the amount was 23,000 tons, and a slightly increased value over the year previous. Being a more concentrated phosphate than any other in the world, it has very naturally been sought for to bring up the acid phosphate fertilizer to high percentages of phosphoric acid. A statement of the analytical composition of a few of the leading phosphates of commerce will indicate the high value of Canadian apatite:

Raw phosphates.	Content of tribasic phosphate of lime. Per cent.
Russian:	
Government of Orel	29·14
Government of Podolia	66·78
English:	
Cambridge coprolite	57·78
French:	
Ardennes coprolite	45·21
Bordeaux phosphate	77·41
Spanish:	
From two mines, from	74–85
West Indian:	
Navassa Island	72·43
Old Curacoa Island	70·99
New Curacoa Island	88·80
Sombrero	81·88
Redonda	87·73
Elroque	69·86
Rio Grande:	
Bone-ash	70–80
South Carolina:	
Coprolite	48–60
Phosphate	51–61
Canada:	
Apatite	72–94

Those who have secured properties in the Ottawa District have worked them most energetically for all they are worth, and their returns have been very encouraging so far. The expenses vary of course with the conditions; but as a rule, range from four to five dollars per ton, often less, sometimes a little more. These figures are, however, the result of the experience of a number of workings, embracing, at least, seven large mines in the great Ottawa District. The cost of the mineral laid down in Montreal may be estimated at from $7 to $9 per ton. Freights to New York may be had at from $3 up by boat, and for long contracts easy railroad rates may be secured directly from the mine to destination. Prices this season in Montreal have ranged from $18 to $22 for choice shipments.

The quantity of this material which our market can deal with will depend mainly on the cost of our sulphuric acid. Already a great change has recently taken place in the plant of several American manufacturers and acid has occasionally touched very low figures. Among manufacturers of acid, opinion has changed in regard to the economy of pyrites over brimstone. Some of the best known pyrites contain in average samples about as follows:

	Virginia.	Capelton, Canada.	San Domingo.	Spanish.
Sulphur	47·50	46·60	49·00	46·00
Iron	44·00	45·00	43·50	43 50
Copper	2·60	4·10	3·20	3·10

Hitherto, the extraction of copper was the basis of operations at Capelton, and the sulphur was allowed to diffuse itself as dioxide (SO_2) for miles around, injuring vegetation and otherwise damaging property. If the process were reversed, and the ores were worked for their sulphur the by-product would become a snug little profit, as it is in Europe. The Capelton District could supply a very large demand for sulphur for some time to come, and its ores could be worked either in the immediate local-

ity or at some other point more convenient for coal and distribution of the raw material.

It is an immense economy to erect fertilizer-works alongside the acid chambers, as it saves the cost of concentrating the acid required for superphosphate manufacture. As is known to practical men, the acid is used at chamber strength of 1·20 sp. gr. As the competition in the manufacture of fertilizers increases, it will become necessary for almost every maker to manufacture his own acid, to secure his full share of profit. Inability to supply one's self with acid of home make has knocked many a British manufacturer out of the market in his own country. The conditions of a trade do not always remain the same; and if American manufacturers have been able to make a decent profit on well-made fertilizers, it is because the amount of capital in the business was not so large that competition became ruinous. As capital increases and the consumption of fertilizers becomes more general, competition will be keener, and every source of economy, whether it promises much or little, will be squeezed to yield its best results. A few years ago, a prominent statistician gave the consumption of fertilizers for a few of the Southern States, which ran somewhat as follows:

State.	Acres.	Fertilizers in tons per year.
Georgia	6,000,000	100,000
North Carolina	4,663,000	80,000
Virginia	3,500,000	40,000

If the other States could be added, it would soon be found how large is the consumption of manufactured fertilizers. If the home make be taken at twelve hundred thousand tons, then fully a half-million tons of sulphuric acid would be required to treat the raw materials producing the manufactured articles and subsidiary purposes. The large deposits met with between New York and Montreal might be used to satisfy the entire wants of this business. Whether any changes are made in the tariff or not, Americans would not be prevented from drawing supplies of sulphur from Canada. Should any alteration be made in the direction of free importation of sulphuric acid, then new circumstances may arise which may render it desirable to make the acid where the raw materials are found. Those found in Canada are likely to receive an increased share of attention from year to year, both because of their proximity and high value.

Those who have watched the quiet revolution which has taken place in the flour milling trade during the last five years, must have noticed not merely the rapid reduction of the buhrstones and the substitution of rollers; but the very large increase of capital, which has been attracted to the business. Important as flour milling is to a country, and the adoption of the new methods, so rapid a change was not more needed in the miller's trade than it is in the manufacture of acids. If ever the United States becomes great as a manufacturing nation, it will be largely the result of cheapened sulphuric acid. So manifold are its uses apart from the fertilizing trade, that one can scarcely think of an industry which can be carried on without its aid in some one or other of its operations. Cheap acid is the basis of all chemical industry, and to be in the front rank as a manufacturing nation has long been the wish and aspiration of the country. For several years, railroad activity has not been less than it is now. There is less competition for money for this purpose than there has been for some time. Taken up by manufacturers, there is less likelihood of such a scheme falling through after a flush of excitement. With the steady growth in the fertilizer trade, and the lessened demand for capital out West for the next few years, there will undoubtedly be a larger share of it for employment East. If the home proportion of the manufacture is to increase, acid must be as cheap here as it is in Europe. The quantity of acid a country consumes is often assumed as a test of progress in the manufacturing arts and of its position in the commerce of the world. The consumption is determined by the cost of the article, and this again may be governed by the people themselves. Not consumption only, but the amount which a country can manufacture, may also be rightly regarded as a proof of its civilization. J. C.

A COMPARISON OF THE WORKING OF GERMAN AND ENGLISH BLAST-FURNACES PRODUCING FOUNDRY PIG.—II.

The proportion of the ratio of carbonic acid to carbonic oxide in the gas is the result of three reactions entirely independent of one another. First of all, there is a constant quantity of carbonic acid derived from the reaction:

$$Fe_2O_3 + 3CO = 2Fe + 3CO_2.$$

If the quantity of carbonic acid is calculated from this formula, we obtain a theoretical maximum from which a certain quantity must always be deducted, which results from the reduction of iron in the lower part of the furnace, accompanied by the formation of carbonic oxide.

This percentage is the true measure of the efficiency of the furnace. Every irregularity in its working, a mistake in regulating the burden, too cold blast, incorrect proportioning of the furnace, always make it greater, and it will never disappear entirely.

Secondly, we have a quantity of carbonic acid in the gases varying with the character of the ore, which is derived from the carbonic acid of the mixture and escapes without being reduced. The quantity can not be exactly expressed in percentages of the entire contents of the carbonic acid in the mixture, though attention may be called to the fact that Bell assumes it to be nearly naught, while other metallurgists put it at less than fifty per cent.

A third factor influencing the ratio between carbonic acid and carbonic oxide in the gases is the quantity of carbonic oxide which is necessary to provide the heat for other purposes of the furnace besides that for the reduction of the ore. This quantity is dependent upon the amount of cinders and the temperature of the blast.

It is, therefore, a difficult matter to use Bell's coefficient or Gruner's figure *M* as the basis of comparison between the results of working at different localities. Therefore, the question of the utility of great furnace capacity can not be settled in this way. It would be possible to approach a conclusion if a reasonable assumption could be made as to the percentage of the carbonic acid in the lime which escapes unaltered. That, in the most favorable case, it can not be fifty per cent, seems to be shown by Bell's experiments, and therefore the assumption that twenty-five per cent is nearer correct seems warranted. Assuming twenty-five per cent as the quantity of carbonic acid in the limestone not reduced, our examples would yield the following:

	Cleveland.	Hartz.
Quantity of carbonic acid, missing in the gases, and therefore converted to CO	353 kgs.	671 kgs.
Assuming 75 per cent of carbonic acid in mixture converted to carbonic oxide, then there is missing on this account	229 kgs.	578 kgs.
Difference resulting from direct reduction of Fe_2O_3 by carbon, or by reconversion of CO_2 by C into CO	124 kgs.	93 kgs.

This shows that the quantity of carbonic acid, compared with the tota resulting from the ideal reaction, according to the formula quoted above, indicates a loss of heat of 11·03 per cent in the case of the Cleveland furnace and 8·04 per cent in the case of the Hartz furnace. The smaller furnace, therefore, shows more favorable results so far as the work of reduction is concerned. It is reasonable to infer that with poor ores, in which the presence of easily melted cinder constituents does not interfere with the work of reduction, a passage through the furnace in twenty-four hours suffices completely to attain the most favorable reduction. In the case of rich ores, there may be a modification, because with them the reducing gases are more diluted on account of the lower consumption of coke. They therefore act less energetically, and require a longer time for their passage through the furnace. There is every reason to believe, however, that this has a less important influence than is generally believed. With poor ores carrying a high percentage of limestone, it is possible to go even farther, and to hold that a large cubical capacity is not alone unfavorable, but is directly injurious, so far as the work of reduction and therefore the consumption of coke are concerned. The increased velocity of the current of gas ascending in the furnace has both a favorable and an unfavorable influence. The conditions affecting the reduction of the iron become more unfavorable, because the iron oxide is exposed in the colder part of the furnace for a shorter time to the reducing current of gas, and therefore a larger percentage of it must be reduced in the lower part of the furnace, entailing the formation of carbonic oxide. But, on the other hand, the conditions affecting the retention in its present form of the carbonic acid of mixture become more favorable, the less the carbonic acid has time to combine with the carbon of the coke through which it passes. Experience in Germany in reducing the time in which a charge passes through a furnace from thirty to twenty-four hours has taught that it did not injuriously affect the consumption of coke, and that with the same ores in a charcoal furnace the best results were obtained in making deep gray pig by going as low as seventeen hours. It is often held that a large furnace capacity tends to create a better utilization of the heat of the rising current of gases. Dr. Klüpfel reaches the conclusion that, in the case of the comparison of the Cleveland and Hartz furnaces, this is not so. He then enters into a long discussion of the differences in making No. 1 and No. 3, so far as they affect the consumption of fuel for the different purposes for which it is required in a blast-furnace. He reaches the result that the large English furnaces do not offer any advantages over the smaller German ones with poor ores; that, on the contrary, the reduction of the iron is more favorable, and that the heat of the ascending current of gases is better utilized. He then goes into the question what disadvantages, so far as the consumption of fuel is concerned, are caused by the use of poor ores in Germany, by the greater percentage of lime in the cinder, and the fact, on the other hand, that in England roasted ores are used and a higher temperature of blast is generally employed. He combats the idea that the greater consumption of fuel in the German furnaces should be attributed solely to the lean ores, and shows by calculations that fully an equal excess is due to the fact that the German furnaces make a cinder containing fifty per cent of lime, as compared with forty per cent in Cleveland, his figures in this special case being an increase in the fuel consumption, on account of lean ores, of 170 kilograms carbon per thousand kilograms of iron, and 165 kilograms of carbon for the higher percentage of lime in the cinder. He traces to the use of the calcined ores the saving of fuel of 163 kilograms as a possible maximum, while he attributes to the use of the hotter blast a saving for the Cleveland furnace of 42 kilograms. Adding all these sources of economy on the one part and unavoidable increase of fuel consumption on the other part, he reaches a difference of 545 kilograms. This again involves the combustion of a smaller quantity of coke before the tuyeres, so that the volume of gases is smaller and an additional saving results, which he places at 82 kilograms of coke. The English furnace, on the other hand, uses 47 kilograms more on account of unfavorable reduction, and 101 kilograms because of the increased radiation resulting from slower working. Balancing these two accounts, the figure 373 kilograms is reached, which is almost the same as that actually found by experience.

Going over these various points with reference to what suggestions they lead to in the working of poor ores in Germany, Dr. Klüpfel sees no reason for increasing the size of the furnace. He does, however, incline to the opinion that in working such ores it might be advantageous to calcine the lime and the calcareous ores. This calcining, he says, should best be done, in order to do it cheaply, with producer-gas, using coal slack or lignite, and simultaneously making tar and ammonia as by-products, though of course the first cost of such a plant would be high and would leave a small margin only over the present methods. He is very emphatic in advocating an increase in the temperature of the blast, recommending the use of brick stoves, although fully appreciating the points which have rendered their working less favorable in Germany. He calculates the saving due to an increase in the temperature of the blast to 700 degrees Celsius at 220 kilograms of coke per thousand kilograms of Foundry No. 3. His final conclusions are, that a consumption of 1800 kilograms of coke per thousand kilograms of No. 1 Gray Foundry pig must be considered a very favorable result using iron stoves; that working slower than at the rate of putting through the charge in twenty-four hours would be rather disadvantageous than otherwise; that, with the employment of the best brick stoves, the fuel consumption would certainly be reduced to 1500 kilograms; and that possibly by roasting the ores, a further reduction to 1300 kilograms could be obtained.

NOTES ON ORE-CRUSHING.

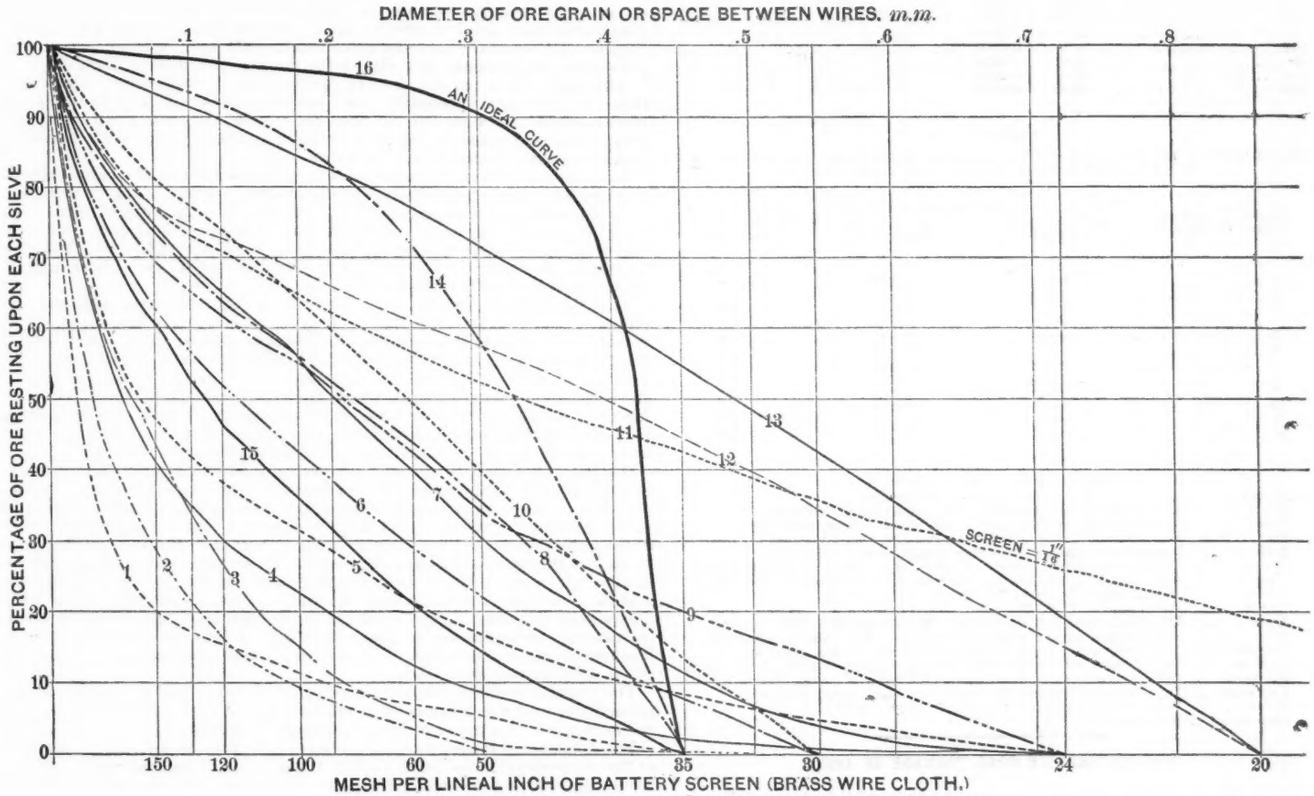
Written for the Engineering and Mining Journal by Luther Wagoner, C.E., M.E.

The most important problem in the concentration of ore is its reduction to grains of a maximum diameter, avoiding the production of dust. Thus, if one fiftieth of an inch (0·5 m.m.) be the maximum size of grain that will sufficiently liberate the valuable mineral, theory shows that all the grains should be of this size, in order to permit of an easy separation of the minerals according to their densities. But it is well known that ore can not be broken at all without producing grains that range in size from the largest pieces down to a dust of extreme fineness; therefore, in practice, we must endeavor to produce the minimum amount of dust. Now, if a second blow be struck upon the partially reduced mass, some of the under-sized grains will be still further reduced. The nature of the blow must also be considered. It is plain that it might be heavy enough to reduce the whole mass to dust at once, or it might be light enough to just halve the piece. Hence we can easily see that, if the ore be successively struck such blows as will just halve the pieces, removing all sufficiently reduced grains at the time they are formed, we have a practical solution of the problem.

For the purpose of examining more thoroughly what takes place when ore is reduced in the various mills, specimens of the pulp were obtained from various places, and the results are given in the accompanying diagram. For the purpose of reducing battery screens to uniform measure, the set of standard needles used for gauging the holes in Russia iron screens was measured, the result being given in table No. 1. Samples of brass wire and steel wire cloth were also measured, to ascertain the net space between the wires, the results being put on record in table No. 2.

The ore, if crushed wet, was evaporated so as to preserve all the slime, weighed, and then passed through sieves, usually from 30 to 150 mesh. The amount remaining upon each sieve was then weighed, and the dust finer than 150 mesh estimated by difference, this being more accurate than the direct weighing, as a considerable quantity of dust floats away in the air while being sifted (in the Knox ore, the maximum sized grains that floated in the air and settled upon a slide placed one foot away from the sieve was 0 025 m.m.). The percentage of each lot was next calculated, and, beginning with the coarsest, the finer sizes were successively added. For example, suppose the ore to have been crushed to pass a 24-mesh screen, and that screen No. 30 retains 5 per cent of the total, while sieve 40 carries 6 per cent, and sieve 50 carries 3 per cent, it is plain that if No. 30 sieve had not been used, 5 + 6 per cent = 11 would have been found on No. 40, and 5 + 6 + 3 = 14 per cent would have been found on No. 50 if all the ore had been "put through" it at once. By treating the results in this manner, both ends of the curve are known, while the successive additions serve to fill up the space between them. It may be objected that the free-hand curve from No. 150 mesh to zero has only a hypothetical value; and to test it, the curve No. 5 (Virginia City, Nev., quartz, wet crushed) was carried as far as 0·02 m.m. diameter of grain. Down to sizes as small as 0·0002 m.m., no change in the form of the grain was noted. In other words, a quartz grain of 0·7 m.m. does not differ in form and external appearance from the smallest that can be examined, and therefore, each ore has *its law of crushing* for the particular methods employed, and the curves are the graphic illustration of the law.

It will be at once observed that all stamp mill curves are convex toward the origin of co-ordinates, while roller mill curves are concave. The very remarkable curve No. 14, with its small percentage of slimes, was obtained from an exceedingly hard, tough quartz, carrying about one quarter per cent of "gray copper" ore. The ore was broken to 1½ inches in a rock-breaker, dried, and passed through the Tustin pulverizer, which may briefly be described as an annular ring 18 by 48 inches diameter, slatted with ¼-inch by 12-inch slats, and 18 inches by 48 inches inside, an external screen, and two loose rollers of cast-iron, one 15 inches by 18 inches diameter, and the other 18 feet long by 20 inches diameter, which rest inside of the ring. The rollers serve to crush the ore by their weight and the rotation of the ring, the peripheral speed being 5 feet per second. The construction is such that the crushed ore is nearly all removed at each revolution, as about ten times as much available screen surface is allowed in the machine as compared with that of a wet stamp-mill. One of the essentials of a good mill, namely, a prompt removal of the crushed ore, is well carried out; the other essential that the blow must be proportional to the work, is a compromise, and is perhaps as good as can be obtained where the ore is all reduced in the same machine. Compare this curve with No. 15, representing work on the same ore and screen, but crushed in a wet stamp-mill. About 50 per cent more of ore finer than 100 mesh is obtained; the extreme hardness of the quartz and the very brittle nature of the mineral made it impossible to concentrate the ore when wet crushed, the tetrahedrite floating away with the battery water. Curves 6 and 10 are from the same ore, the experiment being made to see what difference would be made in crushing a small piece of quartz with and without sifting. With the exception of No. 2, all the samples were taken by the writer.



The Dodge machine offers an abundance of screen surface for the escape of the ore, perhaps more even than the Tustin; but it employs cobblestones or hard lumps of the same ore to reduce the fragments which have passed a closely set rock-breaker. The action is thus partially abrasive, and a certain amount of dust is produced that the purely rolling or percussive action would avoid. It is this abrasive action that causes curves 8 and 12 to have contrary flexures. Only one sample of work from rolls could be procured, No. 11; but the screen is too coarse to admit of more than a conjecture of what it would do on work ranging from No. 24 to No. 70 sieve; the convexity of the curve would indicate that it would still remain so on finer work. Curves 8 and 13 represent work on the same ore, but with different screens. The production of so great a quantity of slimes by stamps is directly traceable to two causes: First, the blow is often in excess of what is needed, thereby overcrushing much of it. Secondly, a failure to promptly remove the crushed ore, through insufficient screen surface, which causes the ore to be churned and hammered still finer; practically the latter is the most serious of the two, because it will always be necessary to break the ore in some manner, while it is always possible to devise some more efficient method of removing the crushed ore than that now in use.

The practical conclusions to be drawn from the diagram (1) are as follows: Stamps can never be used successfully for the preparation of gold and silver ores for concentration; and in any successful machine

whose work will approximate to the ideal curve 16, the following principles must be regarded :

The blow must be proportioned to the work.
No abrasive action upon the ore is wanted.
The ore, when crushed to proper size, must be immediately removed.
It can not be reduced in the same machine.
It must work either wet or dry.
It must be simple, strong, and durable.

TABLE NO. 1.—SHOWING THE NET SPACE BETWEEN THE WIRES OF CLOTH USED FOR BATTERY SCREENS AND SIEVES. SAN FRANCISCO, CAL.

Trade Number or Holes to the Lineal Inch.	Brass wire cloth.		Steel wire cloth. Foreign.		Steel wire cloth. Domestic.	
	m. m.	Inches.	m. m.	Inches.	m. m.	Inches.
12	1·55	0·0610	.....	.....	.....	.....
14	1·32	0·0520	.....	.....	.....	.....
16	1·25	0·0490	.....	.....	.....	.....
18	1 09	0·0430	.....	.....	.....	.....
20	0·94	0·0370	.....	.....	.....	.....
24	0·73	0·0290	0·69	0·027	0·64	0·025
30	0·55	0·0220	0·56	0·022	0·48	0·018
35	0·47	0·0190	0·49	0·019	0·38	0·015
40	0·40	0·0160	0·42	0·017	0·33	0·013
50	0·30	0·0120	0·36	0·014	0·26	0·011
60	0·25	0·0100	0·29	0·011	0·19	0·008
64	0·24	0·0090	0·28	0·011	0·18	0·007
70	0·22	0·0090	0·25	0·010	0.16	0·006
80	0·20	0·0080	0·23	1·009	0·14	0·005
90	0·18	0·0072	.....	.....	.....	.....
100	0·16	0·0061	.....	.....	.....	.....
120	0·12	0·0050	.....	.....	.....	.....
150	0·08	0·0030	.....	.....	.....	.....
160	0·06	0·0026	.....	.....	.....	.....

TABLE NO. 2.

MEASUREMENT OF THE THICKNESS OF THE STANDARD NEEDLES USED FOR GAUGING HOLES IN RUSSIA IRON BATTERY SCREENS. SAN FRANCISCO, CAL.

Trade Number of Needle or Screen.	Diameter of needle or hole in m.m. Calculated.	Diameter of needle or hole in inches. Measured.	Nearest trade number of brass wire cloth.
No. 1	1·110	0·0436	No. 18
2	0·996	0·0392	18
3	0·950	0·0374	20
4	0·863	0·0340	20
5	0·813	0·0320	24
6	0·720	0·0284	24
7	0·662	0·0261	24
8	0·580	0·0228	30
9	0·515	0·0203	30
10	0·452	0·0178	35
11	0·391	0·0154	40
12	0·375	0·0148	40

EXPLANATION OF THE DIAGRAM (1).

No. of curve.	How crushed, and remarks.
Six	Dry, hand mortar, no sifting, very hard quartz, Redwing.
Ten	Dry, hand mortar, sifted each two blows, quartz. Redwing.
One	Dry, stamps, Victorine mine. Austin, Nevada, silver ore.
Two	Wet, stamps, San Juan del Rey, Brazil, quartz (Phillips).
Three	Wet, stamps, Minas Nuevas, Alamos, Mex., silver ore, porphyritic.
Four	Dry, stamps, Minas Nuevas, Alamos, Mex., silver ore, porphyritic.
Five	Wet, stamps, Virginia City, Nevada, average pulp.
Seven	Wet, stamps. N. Y. Hill mine, Grass Valley, Cal., quartz.
Eight	Dry, Dodge crusher, Knox mine, Mokelumne Hill, Cal., quartz.
Nine	Wet, stamps, Porter mine, Calaveras Co., Cal., quartz, silver ore.
Eleven	Dry, Krom rolls, Geddes & Bertrand mill, Nevada, silver ore.
Twelve	Dry, Dodge crusher, Redwing, Murphy's, Calaveras Co., Cal., quartz.
Thirteen	Dry, Dodge crusher, Knox mine, Calaveras Co., Cal., quartz.
Fourteen	Dry, Tustin pulverizer, Redwing, very hard, tough quartz.
Fifteen	Wet, stamps, Redwing, very hard, tough quartz.
Sixteen	Ideal curve.

THE ANTHRACITE COAL TONNAGE IN 1883.

Mr. John H. Jones, official accountant, has published the following statement of the anthracite coal tonnage for the month of December, 1883, compared with the same period last year. This statement includes the entire production of anthracite coal, excepting that consumed by employés, and for steam and heating purposes about the mines :

	December, 1883.	December, 1882.	For year 1883.	For year 1882.	Difference.
Philad'a & Reading RR.	754,918	644.423	10,487,003	7,000,113	I. 3,486,890
Central RR. of New Jersey	*	348,349	1,745,399	4,211,052	D. 2,465.653
Lehigh Valley Railroad	†422,572	524.932	6,271,773	5.933.740	I. 338,033
Del., Lack. & West. RR.	370,704	408.650	5,079,123	4,638,717	I. 440,406
Del. & Hudson Canal Co.	‡2'3,995	296.320	3,512,972	3,20[illegible]168	I. 309,804
Pennsylvania Railroad	215.794	163,373	2,773,419	2,332,974	I. 440,445
Pennsylvania Coal Co	108,975	125,276	1,541,145	1,469,821	I. 71,324
N. Y., L. E. & West. RR.	36,290	88,116	382,194	330,511	I. 51,683
Total	2,133,248	2,599,440	31,793,028	29,120,096	I. 2,672,932

* Included in tonnage of Philadelphia & Reading Railroad.
† This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 7059·10 tons. Total for year, 80,124·07 tons.
‡ In addition, there were 48,761 tons transported from mines by the Delaware & Hudson Canal Company during December, which is included in tonnage of other interests. Total for year, 575,247 tons.

The stock of coal on hand at tide-water shipping points, December 31st, 1883, was 748,330 tons ; on November 30th, 696,380 tons ; increase, 51,950 tons. The amount on hand December 31st, 1882, was 562,116 tons.

Of the total production in 1883, 15,604,492 tons, or 49·08 per cent, was from the Wyoming Region ; 6,113,809 tons, or 19·23 per cent, from the Lehigh Region ; and 10,074,726 tons, or 31·69 per cent, from the Schuykill region.

Eastern competitive tonnage, including all coal which, for final consumption or in transit, reaches any point on Hudson River or the Bay of New York, or which passes out of the Capes of the Delaware :

1882 ..... 12,018,764 tons.
1883 ..... 13,148,185 tons.

ABOUT SOME OF THE PROPERTIES OF STEEL.*

By Alfred E. Hunt, Pittsburg, Pa

It is the object of this paper to discuss some of the properties of steel, and to give the writer's opinion as to the desirable combination of these properties in steel for some specific purposes.

According to the latest definitions, unofficially accepted by the various engineering societies, and adopted in the United States tariff laws, steel includes a material as soft and pliable as any wrought-iron, or as hard as flint; a material of an elasticity of the famous Damascus blades, or as brittle as glass ; a material with 25 per cent more ductility than the best iron, or one of two hundred thousand pounds tensile strength to the square inch, and almost no perceptible elongation ; a material that will weld nearly as well as the best wrought-iron, or a steel differing from chilled cast-iron only in its malleability ; a material varying from almost nothing upward in any of all these properties.

It is this last property alone of *malleability* which, although it may vary, must still be clearly manifest, which limits, and with the short word *cast* before it (describing the method of producing the metal) defines among the iron-containing metals that much used and also abused material, *steel*, according to the definitions of our *savants*.

It may be mentioned here, that a definition that in concisely describing steel shall include every possible variety and exclude every thing else, has been found to have been a troublesome undertaking, and that among the aforesaid *savants* two of our members have taken very prominent parts, and have aided a great deal in shaping these definitions for both engineering societies and the government officials. I refer to our ex-president, Mr. William Metcalf, and to the late Mr. James Park, Jr.

Although these properties of malleability, brittleness, elasticity, tenacity, ductility, pliability, and hardness, are all modifications of the molecular force called *cohesive attraction*, they are nearly opposite properties, and may be crudely divided as those going with hardness and those with softness and pliability.

In good steel, these properties are in well-defined relations and proportions to one another, increasing in the amount of one property bringing a corresponding decrease in the opposite quality ; as, for instance, hard steel of over 2 per cent carbon is very difficultly malleable, and soft low steel is as easily malleable as the softest wrought-iron, but has almost lost its power of being hardened, and can be whittled with a stout knife almost as easily as lead.

The chemical composition has much to do with the preponderance of either set of these qualities ; in fact, good steel for any specific purpose is made of a certain chemical composition within quite close limits, which limits are generally narrowed accordingly as the physical requirements are more numerous and difficult, but not necessarily because a steel has the required formula of chemical composition is the metal satisfactory. It may not have been properly made, it may not have been properly heated, or worked into the required shape ; in short, it may have fully as many physical causes of failure as it has chemical.

A malleable metal is one that can be reduced in section by hammering or rolling. The malleability of steel depends largely on its chemical composition ; the less foreign ingredients, except in the case of manganese, the more malleable. Steel of less than 0·06 per cent carbon becomes so oxidized generally as to have its malleability seriously diminished, but can be forged into bars and shapes with over three per cent carbon. Manganese, up to one and a half per cent in steel, made by the open-hearth and Bessemer processes, increases its malleability. Vanadium, titanium, chromium, aluminium, and wolfram have each been alloyed with steel in varying amounts up to three quarters of one per cent, to obtain a hardening effect combined with toughness, and without much injuring the malleability of the metal.

The changing of the relative situation of the atoms of a steel ingot by reducing it under a hammer or between rolls while the metal is above a red heat, gives it a much stronger cohesive attraction.

The denser and more compact the steel is formed in an ingot, the less of this reduction, technically called "work," will be required. Ordinarily, the lower the carbon, the more occluded gases are left, as blow-holes in the ingots ; high crucible steel, however, has a peculiar structure at the top of the ingot, called "piping." All these open structures can be almost entirely eradicated by placing a heavy pressure upon the molten metal immediately after casting, and many devices have been tried to secure this end. In some recent work by Mr. G. W. Billings, of Cleveland, Ohio, he has placed a pressure of 1400 pounds per square inch upon the molten metal, and has succeeded in producing perfectly sound ingots of crucible steel from top to bottom, where the other ingots of the same grade of material melted at the same time show the characteristic piping. This seems to the writer to be a step in the right direction, and points to a way of avoiding the open structure of steel ingots, which is one of the greatest sources of weakness and which necessitates a large amount of work to be overcome. Ferro-silicon, an alloy of iron, manganese, carbon, and silicon, is added as a physic to steel to produce sound ingots. This method leaves about one quarter of one per cent of silicon in the metal, which is rather a source of weakness, but is well adapted for the purpose for which it is coming into general use—the producing of solid steel castings, especially by the open-hearth and Bessemer processes. Ordinary Bessemer and open-hearth steel ingots need to be reduced to at least one tenth their sectional area before showing their maximum cohesive attraction. Thus, a steel forging of 18 inches diameter needs to be reduced from an ingot of at least 57 inches diameter, in order to have the steel get its proper work ; but here comes other difficulties of uniformly heating such a large ingot so that the center will have as much heat as the outside, and of obtaining a heavy enough hammer to penetrate and work the interior of the ingot. To properly forge an ingot of fifty-seven inches diameter, a fifty-ton hammer is required, and the fitting up of a fifty-ton hammer plant is, to say the least, a ponderous task. The writer believes that the best way to make large steel forgings is to make them of about 0·20 per cent carbon and one per cent manganese steel, which has been cast into fourteen-inch ingots rolled to muck bar of six by one inch and piled and welded as

*A paper read before the Engineers' Society of Western Pennsylvania, December 18th, 1883.

in iron forgings. This steel will stand the heat and can be welded about as well as iron, and, although having the same objection of welds as in iron forgings, will have the superior tenacity and ductility of steel over iron. Ordinary crucible steel requires to be reduced to about one quarter the original area of the ingot.

An elastic metal is one that will resume its original form or shape after having been extended, bent, or compressed by some external force. Different steels possess this property of elasticity in very different degrees. The limit of elasticity is generally spoken of as the number of pounds of strain per square inch that a sample will stand and again resume its original shape after the strain has been removed. The softer and lower the tensile strength of the steel, the lower the limit of elasticity; in the softest steel, the tensile strength is about fifty thousand pounds per square inch, the contraction of area about seventy per cent, and the limit of elasticity about twenty-five thousand pounds per square inch; in the highest tempered steel, the tenacity runs up to two hundred thousand pounds per square inch, the contraction of area reduced to almost nothing, and the elastic limit raised to very near the ultimate strength, say one hundred and ninety-five thousand pounds per square inch.

A hard steel is one in which the particles resist impression, separation, or the action of any force which tends to change their form or arrangement. All these modifications of cohesive attraction which give rise to the properties of malleability, ductility, tenacity, hardness, etc., are dependent upon the particular form of the atoms of the material and the particular manner in which they are arranged. The arrangement and form of the composing atoms of steel can be changed by heating it red-hot and then cooling it either slowly and allowing the crystals to arrange themselves naturally, as it were, or very quickly, allowing but little time for this molecular arrangement; in the one case, we have an annealed material with superior properties of the soft, pliable, and ductile division to the original material; in the other, we have a hardened steel of superior tenacity and properties of the hard order, but with corresponding sacrifice of the soft qualities of ductility, etc. That there is an entire difference in the arrangement of the composing atoms between ordinary steel and the same material hardened, can be readily perceived by examining the fractures of the two specimens, also by noting the increased size of the hardened steel. There is, too, a chemical change in the condition of the carbon in hardened steel; this fact is not generally understood. It has a practical bearing in the estimation of carbon by the color method; for the condition of the carbon is so changed that it does not yield to the same extent the characteristic brown color to a nitric acid solution of the steel upon which the color carbon method is based. Hardened steel always yields a lighter color, and gives varying results from five to thirty per cent less of carbon by the color method than actually exists in the steel as obtained by gravimetric methods of analysis, or as obtained by the color method from the same material in its natural condition.

Open-hearth and Bessemer steel begins to show material hardening in the fracture at about 0·30 per cent carbon, and in one half-inch square bars will fly with a sharp blow of the hammer. In open-hearth steel, there is a considerable variance in hardness beyond that given by its chemical composition by the character of the stock from which the metal is made. The best results for soft boiler plate and other steels where softness is one of the leading requirements can not be had where a great deal of high steel scrap is one of the components of the metal. Also the different character of the flame used in the open-hearth furnace alters the hardness; steel made by a smoky reducing flame is generally harder and at the same time has, proportional to the increased tenacity, more ductility than steel made of exactly the same chemical composition made with a cutting oxidizing flame. For these reasons, two heats of spring steel with say 0·75 per cent carbon each, and of exactly the same chemical composition, may appear like steel with fully 0·10 per cent carbon difference, it being due in the one case to the use of steel scrap high in carbon and manganese in its composition, and in the other to low material, and in the one case the reducing flame being used in the melting-furnace, and in the other a sharp oxidizing flame.

Manganese is a hardening element in steels. This is especially noticeable in the open-hearth and Bessemer metal, where it often exists in amounts of one per cent and over. Over three quarters of one per cent of manganese in spring steel will make it brittle and liable to break after hardening.

Steel, of no matter how low carbon, will harden somewhat, as shown by increased tenacity and decreased ductility in the suddenly cooled steel. On this account, and because the higher steel becomes more rapidly crystallized and brittle under repeated shocks and vibrations, and also because, the writer thinks, in all the soft structural steels, it is more the increased ductility rather than the increased tenacity over iron that gives soft steel its superiority, he believes that for boiler plate, steel chain, ship plate, and the like material, it is far better to use a steel of not over sixty-five thousand pounds ultimate strength, with a contraction of area of from fifty-five to seventy per cent, and with an elongation of from twenty-five to thirty per cent in eight inches, than if made of material of over sixty-five thousand pounds per square inch tensile strength, and with a decreased ductility, although this ductility may be in good proportion to the increased tenacity.

The writer believes the United States government laws allowing marine boilers to be made of less thickness, or to carry a higher steam pressure, accordingly as the tenacity is higher, and with a correspondingly sacrificed ductility, to be wrong, and that the thinner shell and higher steam pressure should be allowed accordingly as the ductility is greater with a tenacity of not less than 55,000 pounds nor more than 65,000 pounds per square inch.

A flexible metal is one that will allow considerable motion of the particles on each other without breaking. The flexibility of steel is usually tested according to the English Admiralty test by bending it around a bar of diameter equal to about twice the thickness of the rod or plate to be bent, and noting the angle through which the specimen is bent before rupture, or in cases of very soft steel, by bending it backward and forward through an angle of ninety degrees, alternately each side of the perpendicular. Soft steel of 0·10 per cent carbon rolled into thin plates and horseshoe nails stamped therefrom will, after annealing, bend thus from six to eight times before rupture. The best quality of Bessemer and open-hearth steel forged into bars of two by five eighth inches and annealed will bend over double upon itself without breaking or shearing up to about 0·55 per cent carbon, and is the test of the 0·55 per cent carbon material from which locomotive tires are made.

A tenacious material is one that resists separation in the direction of its length. The tenacity of steel is generally spoken of as the number of pounds pull it takes to the square inch of its section to rupture it.

The ductility of steel is often spoken of either in the terms of its percentage of elongation or the percentage of contraction of area of the section of the ruptured specimen. As the percentage of elongation in the same material varies inversely to the length of the specimen pulled apart, the percentage of reduction of area is a more uniform quantity, and is coming more into use for measuring and comparing the ductility of different samples of steel.

Unless directly specified as being computed upon the contracted area, the ultimate strength and elastic limit is understood to be calculated upon the original area of the section.

Some requirements demand that the ductility shall be measured by the percentage of elongation or contraction of area at the "*moment of failure*," or the instant that an increase of pressure ceases to be recorded by the testing-machine. As usually a very considerable flow of the metal and extension takes place after this "*moment of failure*," this method of obtaining the measurements gives results about 25 per cent less than those obtained in the usual way, and does not give correctly the true ductility of the metal, as the elongation and contraction will be less, accordingly as the limit of elasticity is nearer the ultimate strength.

Many orders for steel are placed with requirements for a given tensile strength per square inch, and perhaps with a given elastic limit, but with no requirements for a corresponding ductility. Ordinarily, both the tensile strength and the elastic limit are higher in a poor steel made from an inferior grade of stock, and containing more impurities, as notably phosphorus, than in good steel of the same percentage of carbon, so that the fulfillment of a requirement for a given tenacity and elastic limit alone is not a criterion of the quality of the steel.

MINING COMPANIES REGISTERED IN ENGLAND IN 1883.

Mr. Edward Ashmead, of No. 2 Draper's Gardens, London, remarking on the above, says the year 1883 has on the whole been a bad one for mining so far as profitable results have gone, and can not be looked back upon with satisfaction. But for all this, it has been an active one for the formation of new companies, which have been registered steadily and continuously all through the year; rather increasing toward the end. The list in detail is a long one; the following figures give a summary of the whole:

BRITISH.

42	metalliferous mines, with a nominal capital of	.....	£1,554,866
23	coal and iron " "	.....	1,365,700
15	quarries, slate and stone " "	.....	510,000
80	Total	.....	£3,430,566

The situations of the new metalliferous companies are: Ten for the North of England; nineteen for Cornwall and Devon (exclusive of Costbook companies); and thirteen for Wales; and the object: Twenty-five for lead, silver-lead, and blende; nine for tin; four for copper; three for manganese; and one for sulphur. As in former years, a great many are reconstructions of old companies.

FOREIGN.

17	companies for European mines, with	a nominal capital of	..	£1,299,000
2	" Asia "	"	..	120,000
6	" Africa "	"	..	1,145,000
31	" North American mines, "	"	..	4,472 825
15	" South American " "	"	..	4,245,007
71	Total	.....	.....	£11.281.832

Of the new foreign companies, twenty-nine are to mine for gold; eight for silver and lead; eight for copper; one for tin; seven for iron and coal; and one each for phosphate, calamine, and emeralds; while fifteen do not clearly define their object.

In the British section, the largest capital asked is that for the Weardale lead mines—£200,000. No other metalliferous mine seeks for capital carrying six figures, although there are in the list some well-known properties introduced, mines that under former companies have given good profits to their owners, of which the South Caradon copper and the W. B. lead may be instanced. In the coal and iron section, one large concern may be noticed—the New British iron, with a capital of £600,000. There has been little to encourage British mining in 1883; discoveries have been small, and metals have fallen considerably during the year.

As in former years, the formation of new foreign mine companies has far exceeded those registered for the United Kingdom. The foreign companies demand a much larger average capital. The year 1883 exceeds former years for the registration of large capital companies. The following are the principal: The Quebrada (a reconstruction), of Venezuela, with £1,000,000 capital—this, however, includes the railroad; the Nacupai gold, of the same country, £603,000; the Minas-Geraes gold (Brazil) and the Montana, each with £600,000; the Lisbon-Berlyn (Transvaal) and the Venezuelan copper, £500,000 each; the Georgia gold, the La Plata and the Alianza de Cicapra (Venezuela), and the San Rafael (Costa Rica), £400,000 each; the Anglo-American, £325,325; the Rio Sil (Spain), £350,000; the Graskop (Transvaal), £300,000; the New Cicapra and Mercedes (Venezuela), and the Ouray silver (Colorado), £250,000 each; the Montezuma silver (Mexico), £240,000; the Spitzkop (Transvaal) and the Cliff silver (Newfoundland), each £200,000. Eighteen other large companies are registered with capitals of £100,000 and under £200,000.

African diamond companies have no place in 1883, nor do the Indian gold-fields offer any further attractions. The favor given a few years ago to the latter is shifting, and, from indications already commenced, would appear about to transfer itself to the Transvaal District, South Africa. Two or three large companies have already started in this new and hitherto untried field, and these succeeding, others will be sure to follow. The mining investing public are adventuresome as well as persevering, and where one will invest in a mine accessible to easy personal inspection, fifty will embark in concerns in lands practically unknown, and

where "distance lends enchantment to the view." Many tons weight of prospectuses may be expected to pass the Post-Office in 1884, advocating the mining claims of the Transvaal.

The following figures serve to give a comparison of 1883 with preceding years, British and foreign mines combined:

	Mining companies registered.	Nominal capital.
1880	157	£11,940,270
1881	217	20,848,450
1882	169	12,560,800
1883	151	14,712,398

THE RECIPROCITY MOVEMENT WITH CANADA ON COAL AND IRON ORE.

The Association for Reciprocity in Coal and Iron Ore held its second meeting at the Windsor Hotel the afternoon of January 24th. The association was formed at the Fifth Avenue Hotel on January 3d, to secure, if possible, a reciprocity treaty between Canada and the United States, by which coal and iron ore would be placed upon the free lists of the two countries. E. N. Frisbie, of this city, was elected President; W. C. Andrews, Treasurer; and C. J. Pusey, Secretary. Gentlemen were present representing the coal and iron interests of Cleveland, Youngstown, Toledo, and other points. A committee was appointed which, with one from the Board of Trade of Montreal, went to Ottawa, and on Saturday last held a conference with Sir Leonard Tilley, Minister of Finance, and the Hon. Mr. Bowell, Minister of Customs. In their report to the association at the meeting yesterday, the committee stated that it found the Canadian ministers anxious to have lumber and salt included in the proposed treaty, but the New York committee was not prepared to give them any encouragement on that point. The committee had every reason to believe that the Dominion government was very favorably disposed to the proposed treaty, and that, if Congress should place Canadian iron ore and coal on the free list, the Dominion cabinet would exercise the power vested in it and place the same products of the United States on a similar list. A committee headed by the Hon. Galusha A. Grow was appointed to press the matter of a treaty at Washington.

Mr. Charles J. Pusey, the secretary of the new organization, has made the following statement concerning its objects:

A committee, consisting of E. N. Frisbie, James Tillinghast, John Moulton, H. C. Roberts, Samuel Thomas, W. C. Andrews, and Charles J. Pusey, was appointed to visit Ottawa and ascertain the disposition of the Canadian government toward such a movement. This committee was at Ottawa last week, in consulation with the Ministers of Finance and Customs, and was assured by them of the favorable action of the Canadian cabinet.

A wrong impression is abroad that this movement originated in Canada. It had its origin in the United States. The fact that a delegation from the Montreal Board of Trade accompanied our committee to Ottawa last week may explain the mistaken impression. We propose to ask the present Congress to pass an act allowing Canadian coal and iron ore to be entered here free of duty, provided that the Canadian Parliament will also pass a similar act in regard to our iron ore and coal. Efforts will be made to urge immediate action on the part of Congress, and I may say, without mentioning names, that we have several Congressmen pledged to support our movement at the proper time. Should such legislation be obtained as desired, both here and in Canada, the greatest benefit will be ours; for Canada will be giving up revenue to the amount of about $1,000,000, while the United States will have to give up only about $250,000 in revenues. The amount of coal imported into Canada from the United States for the year ended June 30th, 1883, is shown here:

To Provinces.	Anthracite.	Bituminous.	Coke.	Total.
Ontario	439,586	736,176	7,267	1,183,029
Quebec	208,532	3,869	494	212,895
Nova Scotia	19,355	3,618	.....	22,973
New Brunswick	43,911	638	.....	44,549
Manitoba	13,919	90,628	129	104,676
British Columbia	356	373	2	731
Prince Edward's Island	1,597	43	.....	1,640
	727,256	835,345	7,892	1,570,493

The amount of coal and iron ore exported from Canada to the United States for the year ended June 30th, 1883, was as follows:

From.	Coal.	Iron Ore.
Ontario	.....	42,745
Quebec	2,120	.....
Nova Scotia	110,150	.....
New Brunswick	17,670	.....
British Columbia	172,863	1,890
	302,808	44,635

It will be seen that Canada gives up much more at first than the United States does; but Canada looks forward to the development of her iron mines, whose ores are specially adapted to making Bessemer steel, and in the long run the advantages will undoubtedly balance.

The producers of bituminous coal in Northwestern Pennsylvania, who seek a market in and through Buffalo and Rochester, held a meeting yesterday at the Victoria Hotel, to consider the annual production and to consult with the agents of the railroads leading to those points, as to freight rates on their product during the year and as to the general interest of the bituminous coal trade. The following persons were present, representing different companies: G. B. Coryell, St. Mary's Coal Company, Clearfield Coal Company and Cascade Coal Company; E. N. Frisbie, Northwest Mining and Exchange Company; D. Eldridge, Eureka Coal Company; G. G. Boyer and John Murphy, Sandy Lick Gas and Coal Company; Messrs. Bell, Lewis & Yates, Rochester mines; W. G. Platt, Beech Tree mines and Walston mines; F. Williams, Washington, Pancoast, and Oak Ridge coal companies; Messrs. Armstrong & Dennison, Hamilton Coal Company; Messrs. Smith and Cant, Soldier Run mines; Ensign Bennett, Northwestern Coal and Mining Company, Fairmount Coal and Iron Company, and the Bostonian mine; W. D. Mullin, Pittsburg Coal and Mining Company; L. N. Singley, River View Coal Company; I. I. Wagner, Franklin and Churchill coal companies; W. W. Achison and W. H. Smith, Gosford Coal and Mining Company; T. C. Pears, Arnold Coal Company; Galusha A. Grow, Brady's Bend Mining Company; C. F. Hartwell, Pine Run Coal and Mining Company; A. Dowdell, Hazard Wood & Co., and Ormsby Coal Company; A. H. Steele, Filler, Westerman & Co., Mercer Mining Company, and Shenango & Alleghany Railroad; and T. J. Scidmore, Mineral Ridge Coal Company. Galusha A. Grow was elected chairman and A. Dowdell secretary. A committee was appointed to report on the annual production of bituminous coal for the Buffalo and Rochester markets and the best method to regulate the output. The following resolution was unanimously adopted, on motion of E. N. Frisbie:

Resolved, That we are in favor of reciprocity with Canada on coal and iron ore, and we heartily approve the efforts making by the "Association for Reciprocity on Coal and Iron Ore" to secure the necessary action by the governments of the United States and Canada to obtain such a result.

The committee on coal production reported in favor of appointing a committee representing the railroads and the producers of bituminous coal which should have power to regulate the annual production.

THE BULLION PRODUCTION OF THE WEST.

J. J. Valentine, Vice-President and General Superintendent of Wells, Fargo & Co., furnishes the following statement of the bullion production of all the States and territories west of the Mississippi, and also British Columbia and portions of the west coast of Mexico, for the year 1883:

	1882.	1883.
California	$16,332,408	$15,673,314
Nevada	10,363,376	8,771,621
Oregon	646,536	592,980
Washington	140,838	63,526
Alaska	240,000	165,000
Idaho	3,325,738	3,805,827
Montana	8,004,000	9,879,000
Utah	8,143,175	7,017,682
Colorado	25,933,265	24,310,000
New Mexico	3,667,132	3,413,519
Texas	257,597	.....
Arizona	9,298,267	8,133,743
Dakota	2,855,127	2,821,000
Mexico (west coast)	2,532,441	5,022,384
British Columbia	671,845	652,016
Total	$92,411,835	$90,313,612

The gross yield of the various kinds of metals embraced in the above report was as follows for 1883:

	Per cent.	Total.
Gold	32·36	$29,236,492
Silver	52·30	47,229,644
Copper	6·30	6,483,921
Lead	9·04	8,163,550
Total	100·00	$90,313,612

THE COAL TONNAGE OF OHIO.

In his forthcoming annual report, Mr. Sabine, Railroad Commissioner of Ohio, refers as follows to the importance of the coal tonnage, as a factor in the prosperity of railroads:

From the census of 1880, it was learned that the product of coal in the United States was:

	Tons.
Bituminous	41,860,055
Anthracite	28,621,371
Making a total of	70,481,426

A conception of this quantity may be gained by considering it in carloads. A standard load of coal is fifteen tons. There would then be in the above quantity 4,705,428 car-loads. Each car of coal, if of the dimensions of the coal cars of the Columbus, Hocking Valley & Toledo Railroad, would occupy 31½ feet. The train of such cars, with 15 tons each, would be 146,258,881 feet in length, or 27,700 miles. This would make a train of loaded cars reach around the world, with a train 2800 miles long in excess; or 12 trains on an air line from New York to San Francisco, with 964 miles to spare.

The tonnage of the railroads in the United States in 1880 was 290,897,305; of this, 89,622,899 tons were coal. It will be seen, from these figures, that 30 per cent of all the transportation is in coal. No other product at all compares with it in tonnage. Grain stands next in quantity, being 42,003,504 tons, or about 14 per cent of the whole tonnage. The third is classed as "lumber and other products," amounting in tonnage to 25,474,349 tons, or a little over 8 per cent of the entire tonnage.

The product of coal in Ohio in 1880 was, bituminous, 5,932,853 tons, or 395,523 car-loads, making a train 2261 miles in length, equivalent to 12 solid trains of coal on the railroad from Columbus to Indianapolis (198 miles), or three solid trains of coal on the railroad from Columbus to the city of New York, with 33 miles of car-loads in excess of that distance.

There were shipped from the Hocking Valley, by the Columbus, Hocking Valley & Toledo Railroad in 1882, 1,732,936 tons of coal, or in carloads, 115,996, which would make a train 872 miles in length, or seven solid trains of coal on the Columbus & Toledo road (124 miles) reaching from Columbus to Toledo, and a train of miles of car-loads in excess of that distance.

In the State of Ohio, the tonnage was, in 1880, 48,511,186 tons. Of this, 11,186,006 tons were coal, or 23 per cent, exceeding any other production of the State. Grain, flour, and other agricultural products, involving many kinds, amounted in tonnage to 12,003,075 tons, or about 25 per cent.

It may be inferred from this that grain alone stands next in quantity. Lumber and forest products are third in rank, and in tonnage were 3,611,938 tons, or 7·4 per cent of the commerce of the State.

PRODUCTION OF QUICKSILVER IN CALIFORNIA FOR THE YEAR 1883.

By J. B. Randol.

	Napa	Great Western.	Sulphur Bank.	Redington.	Great Eastern.	New Idria.	Guadalupe.	Various.	Total (flasks.)	New Almaden.	Grand total (flasks.)	Price in San Francisco. Highest. Per flask.	Lowest. Per flask.
January	590	390	280	367	262	112	77	7	2,085	2,497	4,582	$26.75	$26.00
February	295	364	310	181	156	133	7	4	1,450	2,150	3,600	27.25	26.00
March	485	305	335	202	162	142	...	14	1,645	2,230	3,875	28.00	26.75
April	530	294	310	243	142	76	...	3	1,598	1,756	3,354	27.00	26.75
May	325	293	350	135	164	144	....	13	1,424	2,344	3,768	27.00	26.75
June	360	400	91	165	184	137	.	10	1,347	2,214	3,561	28.50	26.75
July	452	446	130	141	150	85	....	2	1,406	2,618	4,024	28.50	27.50
August	695	315	112	94	76	139	...	0	1,431	3,000	4,431	27.50	26.25
September	750	297	265	45	81	164	....	30	1,632	3,010	4,642	26.75	26.25
October	521	215	206	119	134	272	....	0	1,457	2,672	4,129	26.50	26.50
November	613	208	160	78	102	115	....	0	1,276	2,212	3,488	26.50	26.00
December	274	342	63	134	56	87	....	18	974	2,297	3,271	26.25	26.00
Totals	5,890	3,869	2,612	1,894	1,669	1,606	84	101	17,725	29.000	46,725	$28.50	$26.00
Production in 1882	6,842	5,179	5,014	2,171	2,124	1,953	1,138	241	24,662	28,070	52,732	$29.05	$27.35
" 1881	5,552	6,241	11,152	2,194	1,065	2,775	5,228	584	34,791	26,060	60,851	30.75	27.90
" 1880	4,416	6,442	10,706	2,139	1,279	3,209	6,670	1,600	36,461	23,465	59,926	34.45	27.55

SAN FRANCISCO, Dec. 31, 1883.

ELECTRICAL CONDUCTORS.

At a time when the only demand for certain metals and materials which shows evidence of rapid growth is that caused by the expansion of the modern applications of electricity, the following record of experience will be welcomed, particularly as it comes from so eminent an authority as Mr. W. H. Preece, the chief electrician of the English Post-Office Department. In a paper read before the Institution of Civil Engineers, Mr. Preece states that the first aërial conductors were made of copper, and the first gutta-percha-covered wires were of iron; but the positions were soon changed, copper being universally used for insulated conductors, and iron, until lately, for overhead lines. Sir William Thomson detected great variations in the quality of copper, and Mathiessen detected the causes, and established a standard of purity. Such improvements have been made in the quality that copper is now twice as good as it was in 1856. Increased speed of working, improved efficiency of apparatus, and reduced waste of energy have followed the great increase in the purity of copper. Temperature is a disturbing agent in the conductivity of the wire. Resistance increases more than 20 per cent between winter and summer temperatures. Copper has recently been much used for aërial lines. It is less attacked by acids, and has great durability. Hard-drawn wire is now produced which has a breaking strain of 28 tons on the square inch, iron wire giving only 22 tons on the same area. Age does not seem to affect its quality, nor does it appear to be influenced by the currents of electricity employed for telegraphic purposes. The conductors of all cables remain constant. Lightning is supposed to render it brittle. The ultimate effect of the powerful currents employed for electric lighting is not yet known. The size of conductors is controlled by commercial considerations. Sir William Thomson has laid down the law that should control the size of leads for electric light, while that for cables follows strictly theoretical conditions. The best copper for electrical purposes comes from Japan, Chili, Australia, and Lake Superior; but much pure copper is obtained by electro-deposition, either directly from a solution, or by using impure copper as the anode in a depositing bath. Electro-deposited copper has not the strength of ordinarily refined copper. The electrical resistance of commercial iron is from six to seven times that of copper, but its variation, due to the presence of impurities, is even greater. The weight of a cylindrical wire one mile in length, and giving one ohm resistance at 60 degrees Fahr., is called an ohm-mile. While the first iron wire was specified to give an ohm-mile of 5500 pounds, it is now obtained as low as 4520 pounds, and the maximum resistance is specified at 4800 pounds. The ordinary best puddled iron is at present used only for fencing purposes, but a mild English Bessemer steel is largely used for railroad telegraphs and for stays. However, the resistance is very high, owing to the presence of manganese. The wire used by the Post-Office is made from Swedish charcoal iron, with an ohm-mile resistance of about 4520 pounds. Swedish Bessemer, or a specially prepared low-carbon English Bessemer, has been adopted by the Indian government, with an ohm-mile resistance of about 5000 pounds. Cast-steel wire, with a breaking weight of about 80 tons to the square inch, has been adopted on the continent for telephone currents, with an ohm-mile resistance of 8000 pounds, while in England, where speed of working is the prime consideration, and length of span is negligible, electricians are satisfied with a breaking strain of 22 tons on the square inch. In the colonies, where long spans are essential, and speed of working is not so important, the specification is 30 tons on the square inch. The electrical conductivity of iron wire increases with the percentage of pure iron, except where the percentage of manganese is high. An increase in the percentage of manganese augments the electrical resistance considerably more than an increase in the percentage of sulphur or phosphorus. The durability of iron wire is maintained by galvanizing. When the galvanized wire is to be suspended in smoky districts, it is additionally protected by a braided covering, well tarred. In some countries, galvanizing is not resorted to, but dependence is placed on simple oiling with boiled linseed-oil. Such a wire was erected in 1856 between London and Crewe, but the result was very unsatisfactory. More recently—1881—the experiment has been repeated with a similar result. In a climate like that of England, galvanization is imperative. But it is not alone in smoky districts that iron wire decays. It suffers much along the seashore. The salt spray decomposes the zinc oxide into soluble compounds, which are washed away and leave the iron exposed, and this is speedily reduced to mere thin red lines. Where external decay is not evident, time seems to have no apparent effect on iron wire. Thirty-nine years of incessant service in conveying currents for telegraphy have not apparently altered the molecular structure of the iron wires in the open country on the London & Southwestern Railroad. Swedish charcoal iron is imported either in bloom or in rods, principally in rods. Each rod is rolled down to about 0·26 inch diameter, and weighs on the average about 1 cwt. Iron wire could be rolled and drawn into coils 0·171 inch in diameter, weighing 400 pounds and measuring one mile; but 110 pounds is about the best practical limit for transport and use. The Swedish iron owes its value, not only to its comparative purity, but to the fact that it is smelted and puddled entirely with charcoal. The best qualities are a mixture of various ores, and they are known by various brands, the conditions determining those brands being secret. The operation of testing is a most important one, and requisite not only for the user, but also for the manufacturer. Flaws, impurities, faults, notwithstanding the greatest care, will occur, and they can be detected only by the most rigid examination and tests. Tests are mechanical and electrical. The mechanical tests embrace one for breaking strain, another for elongation, and a third for resistance to torsion. For hard steel wire, in place of the torsion test, it is usual to specify that the wire shall bear wrapping round its own diameter and unwrapping again without breaking. The electrical test is simply that for resistance. One thirtieth of a mile of the wire to be examined is wound round a dry wooden drum, and its electrical resistance is taken in ohms by means of a Wheatstone bridge. Galvanization is tested by dipping in sulphate of copper and by bending or rolling round a bar of varying diameter, according to the size of the wire. Special machines have been constructed for the mechanical tests, the condition to be fulfilled being, that for the breaking strain the increasing load or stress shall be applied uniformly, without jerks or jumps, and the elongation machine shall correctly register the actual stretch without the wire slipping. The resistance to torsion of the wire is determined by an ink mark which forms a spiral on the wire during torsion, the number of spirals indicating the number of twists taken before breaking. The perfection to which the manufacture of iron wire has been brought is very much due to the care bestowed upon the specifications by the authorities of the Post-Office. The standard has been gradually raised until it has become very high. Many administrations object to the expense of thorough inspection, with the result that they are the recipients of the rejected material of those who do rigidly inspect. One break in the wire costs far more than its inspection, and one extra ohm per mile affects the earning capacity of the wire in inverse proportion. It is, however, necessary to remark that the mechanical quality of charcoal iron wire sometimes changes with time—its electrical quality remaining unaffected. Tests repeated at some subsequent period may therefore be deceptive unless allowance is made for the effect of time. Bessemer or homogeneous iron wire as a rule improves in its mechanical properties by being kept in stock. The Post-Office authorities have decided to abandon a gauge altogether as applied to conductors, and to define size by diameter and weight. In future, all copper wires will be known by their diameters in "mils," or thousandths of an inch, and all iron wires by their weight in pounds per mile. Steel wire is used for long spans, or for places where great tensile strength is needed; but it is for the external strengthening of deep-sea cables that steel wire is principally adopted. It was first employed in the Atlantic cable of 1865 for this purpose. It has since been generally used for deep-sea cables. The usual diameter is 0·099 m., and it is specified to bear a breaking strain of 1400 pounds, which is equivalent to 81 tons on the square inch. Steel wire has been produced giving a much higher tensile strength. A compound wire of steel and copper was introduced in America about 1874, and it has been extensively tried in both hemispheres, but without success. Recently, a compound wire has been erected between New York and Chicago, a distance of 1000 miles, giving only 1·7 ohm resistance per mile. It has a steel core 0·125 inch in diameter, and is coated with copper electrolytically to a diameter of 0·25-inch. It weighs 700 pounds per mile. Hard-drawn copper, or siliceous bronze of a much lighter character, would be equally efficient. Phosphor-bronze, the hard mechanical qualities and great resisting powers of which are well known, was introduced for telegraph wire about five years ago. Several lengths were erected by the Post-Office. Two long spans cross the channel that separates the Mumbles Light-House from the headland near Swansea. The object in view was to obtain great tensile strength, with a power to resist oxidation, especially active where the wire is exposed to sea spray. This was done in 1879, and in November, 1883, not the slightest change was noticeable in the wire. But phosphor-bronze, though extensively used, has high electrical resistance; its conductivity is only 20 per cent that of copper. Moreover, the phosphor-bronze supplied is irregular in dimensions and brittle in character. It will not bear bends or kinks. A new alloy, siliceous bronze, has recently been introduced to remedy these disadvantages. Phosphor-bronze has disappeared for telegraph wire, and has been replaced by siliceous bronze. The electric resistance of siliceous bronze can be made nearly

equal to that of copper, but its mechanical strength diminishes as its conductivity increases. Wire, whose resistance equals 90 per cent of pure copper, gives a tensile strength of 28 tons on the square inch; but when its conductivity is 34 per cent of pure copper, its strength is 50 tons on the square inch. Its lightness, combined with its mechanical strength, its high conductivity and indestructibility, renders it eminently adapted for telegraphs. If overhead wires were erected of such a material, upon sightly supports, and with some method, there would be an end to the meaningless crusade now made in some quarters against aërial lines. These, if constructed judiciously, and under proper control, are far more efficient than underground lines. Corporations and local authorities should control the erection rather than force administrations to needless expense and to reduced efficiency by putting them underground. Not only do light wires hold less snow and less wind, but they produce less electrical disturbance, they can be rendered noiseless, and they allow existing supports to carry a much greater number of wires. German silver is employed generally for rheostats, resistance coils, and other parts of apparatus in which high resistance is required. It consists of copper 4 parts, nickel 2 parts, and zinc 1 part. It possesses great permanence, and the variation in its resistance due to changes of temperature is small. The effect of age on German silver is to make it brittle. Mr. Willoughby-Smith has found a similar change with age even with wire drawn from an alloy of gold and silver. The form and character of electrical conductors must vary with the purposes for which they are intended. For submarine cables and for electric light mains, where mechanical strength is not required, and where dimensions are of the utmost consequence, the conductors must be constructed of the purest copper producible, for copper is the best practical material at command. For aërial lines, they must not only have great tensile strength, but in these days of high-speed apparatus they must have high conductivity, low electrostatic capacity, expose to wind and snow the least possible surface, and must be practically indestructible. Iron has hitherto occupied the field, but copper and alloys of copper seem destined in many instances to supplant that metal, and to fulfill all the conditions required in a more efficient way, and at no greater cost per mile.

DETERMINATION OF SULPHUR IN PYRITES.—Mr. G. Lunge has undertaken experiments to ascertain whether in the aqua regia used for dissolving pyrites in the moist way there is any advantage in the use of a nitric acid of very great strength. He finds that it is not advisable to take a nitric acid of a specific gravity exceeding 1·42.

According to the *Zeitschrift für Analytische Chemie*, Bodewig effects the opening up of pyrites as follows:

About 0·5 grm. of the sample is introduced into a stoppered flask containing about 30 c.c., about 30 c.c. of water are added, and the necessary quantity of bromine, about 4 c.c., is introduced *at once*. If the bromine is added gradually, sulphureted hydrogen escapes. The flask is immediately stoppered, and shaken for five minutes. There is scarcely any heat evolved. The oxidation is complete when all the bromine has passed into solution, and when no pulverulent sulphur creeps up the sides of the flask. The liquid is rinsed into a flat porcelain dish; the greater part of the bromine is allowed to evaporate in the cold; the solution is neutralized in a beaker with ammonia, but not so as to form a permanent precipitate; it is then poured into an excess of hot ammonia in a platinum capsule, and digested for from ten to fifteen minutes over a small flame. Hereupon it is filtered, the filtrate is slightly acidified with hydrochloric acid, the hot diluted solution is precipitated with barium chloride, and the barium sulphate is purified and weighed in the ordinary manner.

Iron can not be determined in the same portion, as it is volatilized ven in the cold along with the vapors of bromine.

FURNACE MILL, AND FACTORY.

The two furnaces of the Allentown Iron Company which remained in blast are now blowing out. Seventy-five men are thus rendered idle.

The hammer-shop connected with the steel-works of Benjamin Atha & Co., in Chapel street, Newark, N. J., has been destroyed by fire. The loss on the building and machinery is about $10,000, covered by insurance in English, German, and American companies.

A movement is on foot to establish steel-works at Wampum, on the Pittsburg & Lake Erie Railroad. The projectors of the enterprise desire the donation of a building site and a small bonus in money. The land required has been pledged, and it is probable the money will be forthcoming when it is needed.

An application by the owners of one fifth of the capital stock has been made at Youngstown, Ohio, to dissolve the corporation of Brown, Bonnell & Co. The ground for this action is, that the business has been so conducted for the past two years that it was for the best interests of all that there should be a dissolution of the corporation.

After six months' idleness on account of financial troubles, the Greenwood Rolling-Mill, of Tamaqua, Pa., resumed operations January 21st. Fifty men will be given employment at once, but the number will be increased shortly.

The Macungie Iron Company's furnace, Reading, Pa., was blown in January 22d, after a month's idleness caused by chilling.

The fly-wheel in the sheet-mills of the Reading Iron-Works burst January 22d. No one was hurt, but the accident will throw 150 hands out of work for six weeks.

The M. C. Bullock Manufacturing Company has just shipped the following: To Montana, a diamond drill; to the Spring Valley Coal Company, Peru, Illinois, a "Challenge" drill; to the Cleveland Mining Company, Ishpeming, Michigan, a "Climax" drill; and to the Cable gold mines, Cable, Montana, a "Champion" drill. This company also began work this week on the largest order for line shafting ever given in the West. It is for the Pullman Palace-Car Company, Pullman, Illinois, for whom also electric lights are being put in the lumber-yard, and the straight-line engine to drive the electric-lighting plant is refurnishing by this company.

The Lechner Manufacturing Company, Columbus, Ohio, manufacturer of elevating and conveying machinery and roller detachable chain belting, has furnished the Boston & Colorado Smelting Company, Argo, Colo., with an additional chain elevator; the Great Western Manufacturing Company, Leavenworth, Kan., Oman & Stewart, Rockfield, Ky., A. J. Hawes, Johnstown, Pa., the Philadelphia Grain Elevator Company, Philadelphia, Pa., Yazoo Oil-Works, Yazoo, Miss., with detachable chain belting. See advertisement.

Messrs. Hendrie & Bolthoff, of Denver, Colo., and No. 115 Broadway, this city, have sent one of their improved sampling-mills to be used in the School of Mines, Columbia College, this city. The school adopted this machine after examining others.

Miller, Metcalf & Parkin are soon to begin the erection of additional buildings at their Crescent Steel-Works, in Pittsburg, Pa. One building, which is to be of iron, will be 120 by 140 feet, and cost $7000. A melting-house, which is to adjoin, will be 100 by 45 feet, and will cost $3000. The firm will also erect a new brick machine shop, 330 by 25 feet, at a cost of $5000.

The Knowles Steam-Pump Works report to the *American Machinist* an unusually good business, with no dull months for 1883. The increased demand for the regular line of pumping machinery, besides the introduction of several novelties in the same general line, has necessitated the purchase of new tools and the erection of a new brass foundry in connection with the works at Warren which have but recently been completed, and which are fitted with improved facilities for turning out work as rapidly as possible. The demand for pumping-engines has steadily increased, and the setting for a pair of two million gallon pumping-engines for the Wakefield (Mass.) Water-Works is now approaching completion. Besides the manufacture of compound engines, quite a large business in power pumps for water-works has been done with a range of capacity from a half million to three million gallons per day.

The Lidgerwood Manufacturing Company, 96 Liberty street, New York, has recently shipped two hoisting-engines to Messrs. Beckwith & Quackenbush, contractors for the new Washington aqueduct.

The George F. Blake Manufacturing Company, Boston, Mass., reports to the *American Machinist:* We are more than pleased with the result of last year's business, which has greatly exceeded in volume that of any previous year. The increasing demand upon us has necessitated the purchase of more machinery, which, in consequence, has added greatly to our facilities for turning out work. During the year, we have made many new improvements both in construction and design, and have introduced some special lines of pumping machinery. In the line of water-works pumping-engines, we have been very busy, and have placed in successful operation more of this class of machinery than ever before. With the opening of the new year, we find ourselves with a large number of orders, and the prospects are for a very prosperous year.

RAILROAD NEWS.

The Baltimore & Ohio, Ohio Central, and Toledo, Columbus & Hocking Valley railroads are reported to have entered into a pooling arrangement regarding the bituminous coal business of the Hocking Valley. The two great coal companies in the valley are in the pool, and the entire product is thus controlled in the common interest. Large agencies for the sale of the coal have been established in Chicago and Detroit under the new arrangement.

The Cheyenne, Black Hills & Montana Railroad has begun work in earnest. Besides doing some surveying, the company has purchased a block of lots in the eastern portion of Cheyenne, Wyoming, just north of Lake Manitoba, for depot purposes.

A car trust, owned by the Pittsburg & Western, Pittsburg, Cleveland & Toledo, and the Wheeling & Lake Erie railroad companies, has closed a contract with the Lima & Youngstown car companies for the construction of 1000 cars, one half box and half gondola, which will be used by a new freight line which will operate between the coke regions and the Northwest. Work on the contract begins at once, and the cars will be turned out as fast as possible.

A road is projected in Virginia from Danville to Middleburg, a distance of seventy miles. Another road is projected from Linwood to Harrisburg, then westward one hundred miles, to run into Pocahontas and Webster counties.

The Bloomsburg & Sullivan Company has been organized to build a railroad from Rupert, Pa., northward, to Bernice in Sullivan County, where it will connect with the State Line & Sullivan road. The distance is about sixty miles by the line proposed.

The Philadelphia & Reading Railroad Company is making extensive preparations to handle an extensive anthracite coal tonnage this year. In connection with these preparations, a contract has been placed with the car-shops of the company at Reading for 250 new cars, which will be commenced as soon as the material has been procured. An order for 500 coal cars has just been completed at the same shops.

LABOR AND WAGES.

The Southwest Gas-Coal Company, at Pittsburg, January 23d, entered suit for damages against twenty-two coal miners, who, it is alleged, are interfering with the plaintiff's working its mines. The men gave bail in the sum of $500 each.

The iron manufacturers at Portland, Oregon, have given notice to their employés of a reduction of 12½ per cent in their wages. It is believed that a majority of the workmen will accept the reduced wages. The reduction affects 420 men.

The workmen at the Bessemer Steel-Works, Homestead, Pa., have accepted the reduction proposed, and work has been resumed. About 400 men are affected by the reduction, which ranges from 10 to 25 per cent.

There has been no change during the past ten days in the condition of the workmen employed at the mines in Lehigh County. They are receiving from sixty-two to ninety cents per day, and as they can only work when the weather permits, they do not make full-time. Ore is selling at $2.25 per ton, delivered to the railroads, wharves, or furnaces.

The puddlers in the large mill owned and operated by the Reading Railroad Company, Riverside, Pa., struck January 22d, on account of a 12 per cent reduction of wages. Three hundred men are thrown out of employment.

The workmen of S. S. Bent, iron manufacturer, at Port Chester, N. Y., struck January 22d, against a reduction of wages. New men were obtained from New York, but they all left except three, who got intoxicated and were sent to jail.

It is estimated that, during the first weeks of January—owing to the strikes and reduction of wages—at least twenty thousand laborers of various trades have been out of employment, and that not less than $1,500,000 have been lost to them and to capitalists.

It is reported that the miners employed by the Cleveland, Pittsburg & Youngstown Railroad Company are again making riotous demonstrations at Bergholz. Bridges have been torn down, trestle-work wrecked, and other property belonging to the company destroyed.

The Merchants and Manufacturers' Association met at Baltimore, Md., January 21st, to take action on the laws proposed by Governor McLane relative to making eight hours a day's labor, to legalize trades unions, and govern the labor of females and minors. Most of the large manufacturers were present, and a committee was appointed to prepare resolutions, and their report was adopted, requesting the governor and legislature to allow the Merchants and Manufacturers' Association to tell the committee to which the bills may be referred why the bills should not become laws.

The Ohio Screening Commission, consisting of Prof. Edward Orton, John Brashears, and D. D. Williams, have submitted their report to the governor. Two questions were considered: First, methods of screening coal; secondly, modes of payment of wages. The first question is considered a complex and troublesome one, involving another of like character as to how the miner's labor is to be counted to him. He is seldom or never paid by the day. One mode is

by bank measure, on the space excavated in the coal-seam; one by the car or wagon measure; one by weight of the coal in the car as it comes from the mine by a fourth method, pay is made according to the size of the coal marketed; and the fifth method, covering much the largest number of mines in the State, is that of paying for what passes over a screen of given dimensions. All these systems make the miner in a degree his own master, as he can come and go at his own will, and is largely independent of dictation as to the manner in which he shall do his work. Lump, nut, and pea coal are the three ordinary grades from Ohio mines, and for some uses nut coal is coming to be regarded as more convenient and profitable than lump. The complaints are summed up in the general opposition to having the mining price fixed upon only lump coal. The operators claim that they should pay only what the market price will justify. The alternative scheme demands that the miner be credited with the entire weight, to be weighed in mine cars, on small scales, at the mine's mouth. After going over the entire subject as presented to them from various points of view, the majority of the commission, Messrs. Orton and Brashears, reach the following conclusions: 1. Payment of weight before screening. 2. Payment on the several grades of screened coal according to their values. 3. Payment on a single grade of screened coal. The majority recommends that due legislation be had to establish screens of a given pattern and dimensions, to be of flat or round top bars, not less than one half inch wide of steel or iron; the spaces not to exceed one and a quarter inches, and to be of uniform width. They would not have the screening surface exceed 72 square feet outside measure, nor have any gates or devices to reduce the size of the coal. They also recommend the re-enforcement of existing legislation as to payment by scrip, orders, and checks. The minority report of Mr. Williams states that he does not concur with his fellow-members, for the reason that in his judgment the conclusions reached and presented by them are not borne out by the facts or the testimony relative to matters treated beyond the second conclusion, relating to payment on grades of screened coal according to their values.

COAL TRADE NOTES.

CANADA.

PROVINCE OF NOVA SCOTIA.

The Stellarton *Trades Journal* gives the shipments of various mines for the past year, as compared with those of 1882, as follows:

	1882.	1883.
Spring Hill	188,016	203,000
Intercolonial	141,399	137,365
Albion mines	122,469	135,000
Acadia Coal Company	98,145	106,614
Vale Coal Company	84,124	70,882
Chignecto colliery	10,737	18,000
Joggin mines	18,000	28,000
River Hibert		1,000
Sydney mines	133,623	129,000
Reserve mines	74,432	103,748
International	102,927	98,000
Little Glace Bay	69,049	72,371
Gowrie mines	65,364	69,000
Block House	57,447	52,000
Caledonia mines	59,296	51,400
Ontario	23,090	20,000
Lingan	64	12,000
Chimney Corner		1,000
Total for 1883		1,308,380
Total for 1882		1,250,179
Increase 1883		58,201

PROVINCE OF QUEBEC.

The public weigh-houses at Quebec for weighing coal are to be closed and the officials dismissed on the first of February, the coal by-law having been declared illegal.

COLORADO.

COLORADO COAL AND IRON.—A dispatch states that an explosion occurred at Crested Butte the morning of January 24th in the coal mine of this company. So far, only the most meager details have been received, but the loss of life is supposed to be terrible. The explosion was of such force as to wreck the engine-house, which stood fully 100 feet from the entrance to the mine. The supposition is, that the explosion was caused by a leak in the air-compressor.

OURAY COUNTY.

The gentlemen who discovered and now own four coal claims consisting of 640 acres of land on Burro Creek, about 18 miles from Ouray, it is said, will soon organize a company to be known as the Lehigh & Mammoth Coal Company. There are three distinct seams or beds of coal lying one upon the other, with an interval between them of about twenty inches each of slate. Each seam is well defined. The bottom vein is about 14 feet in thickness; the middle vein or seam is 15 feet 6 inches in thickness; and the upper vein about 12 feet thick. The middle vein or seam is apparently the finest as well as the largest. The bottom vein is said to be richer in oil, and, when properly opened, may prove to be the best coal. It is claimed that a first-class coke can be made from the coal in this lower vein. Three workings have been commenced, one on the Lehigh, one on the Mammoth, and one on the James Coumbe locations. The opening on the Lehigh, from which coal is now shipped to Ouray, is in about fifty feet on the middle or 15-foot seam, and about thirty feet under cover, the coal at the breast of the workings being solid and clean. During the last five weeks, the owners have built over six miles of road from their coal-banks to the Uncompahgre road above Lawrence, and are now delivering coal in Ouray daily.

INDIANA.

The coal mines around Brazil average fair time. The Buckeye shaft has shut down. The expenses of running the shaft were so great that the company could not stand it. The new shaft belonging to the Jackson Coal and Mining Company is shipping from 24 to 26 flats of coal a day. This shaft has not been opened three months yet. The rolling-mill and furnace are running full-time.

MARYLAND.

AMERICAN COAL COMPANY.—It is said that this company will, in the near future, put a force of men to work cleaning up and repairing its Caledonia mine, located at Barton, preparatory to operating it during the coming spring and summer. This mine has not been in operation since the spring of 1878, and is considerably out of repair.

MONTANA.

The owners of a coal mine about a mile from Silver City, Lewis & Clarke County, are taking out some splendid coal. The company had to suspend work in December on account of surface water. There is a shaft twenty-five feet deep on the vein. The company is putting in a pump to get the water out; then it expects to take out plenty of coal, as the vein in the lower shaft is about three feet thick.

OHIO.

James F. Clark, aged seventy-seven, President of the Ohio & Pennsylvania Coal Company, a director of the New York, Pennsylvania & Ohio Railroad and of several banks, died of heart disease, January 21st. He was one of Cleveland's wealthiest citizens and a resident for forty-six years.

A suit against the firm of Andrews, Hitchcock & Co., and the firm of Payne, Newton & Co., of Cleveland, has been filed in the Common Pleas Courts by Samuel C. Shaffer, of Franklin County. His petition states that about ten years ago he purchased several thousand acres of coal and mineral lands in the Hocking Valley and sold them to the defendants at their original cost, with the understanding that he was to be manager of the corporation and receive one tenth of the profits. The defendants were to organize the Continental Coal Company and develop the property. The petition charges that the defendants fraudulently sold the property to the Hocking Coal and Railroad Company, and refused to pay plaintiff his share of the transaction. The consolidated properties, he asserts, were mortgaged for millions of dollars.

The Leadville Coal Company, with a capital of $300,000, and which was one of the numerous outside enterprises in which Brown, Bonnell & Co. were financially interested, has passed into the hands of a receiver, Mr. Ralph J. Wick, at present general manager of the company, having been appointed by the court to take charge of the company's property in the interest of its creditors. The appointment was made upon the petition of Charles S. Wooden, who recovered judgment against the Leadville Company to the extent of $18,680, the amount of four promissory notes which had been given to to the company by Brown, Bonnell & Co. and indorsed by them, and which afterward came into Mr. Wooden's hands through the regular channel of business.

The Iron Trade Review publishes an advance statement from the annual report of Andrew Roy, State Mine Inspector. It shows that during the past year 8,229,429 tons of coal were mined in Ohio, which is a decrease of 779,429 tons, as compared with the product of 1882. There are 277 coal mines now in operation in Ohio. Business last year was rather depressed, in sympathy with the iron market. Selling prices have been low in consequence of competition. The encroachment of Pittsburg coal upon the Mahoning Valley market is noted as one of the developments of the year. Another new feature is the pushing of Hocking Valley coal into Chicago and the largely increased consumption of Ohio coal in Canada. Wages are high—about what they were previous to the panic.

The work in the mines at Buchtel has increased since the first of the year, but, owing to the heavy fall of snow, they could not handle all the coal wanted. Now, however, they are running full-time. The change of weather or something has made a demand for coal, but so many mines being stopped, the working mines are crowded with men.

From Steubenville, it is reported that the Averick shaft, operating about sixty men—most of the coal shipped to Cleveland—is working as briskly as ever. Market street shaft, employing fifty men, together with a number of coke-ovens, seems to be doing all it can to supply the wants of the people. The storms probably have made a greater demand at this place, as so much of its coal is consumed by the citizens here. Gravel shaft, at the upper edge of the town, employing some fifteen men, is doing well; while the Bustard shaft, a half-mile farther east, employing about forty men, has not been doing so well, owing to orders being a little slack: it has not been making more than half-time.

PENNSYLVANIA.

ANTHRACITE.

At noon, January 17th, the Lykens Valley vein was struck at Bellmore colliery. The tunnel driven is 200 yards in length, and cost $12,000. Large sums of money have been expended at the different collieries in the district in searching for this valuable deposit, but until now every effort proved ineffectual.

The water from the old slope of the Girard Mammoth colliery has reached the bottom of the new slope, and a second pump has been put in. The two slopes are a mile apart.

The Buck Mountain seam, on the north dip, has been struck in the tunnel on the slope level of Colorado colliery. The length of the tunnel between the Mammoth and Buck Mountain seams is 183 feet.

LEHIGH & WILKES-BARRE.—The Hartford breaker of this coal company, under lease to the Philadelphia & Reading Railroad Company, was burned January 22d, together with many coal cars. The fire throws 600 men out of employment. It was caused by the upsetting of a stove.

PHILADELPHIA & READING.—This company has purchased the lease and improvements of the Stanton colliery, operated by Messrs. Miller, Hoch & Co., and located on the Gilbert & Scheafer tract, near Mahanoy Plane, the product of which has long been noted for the excellence of its preparation. There are eight large collieries on this tract, and the Reading Company has now succeeded in obtaining all except two—the Lawrence and the Draper.

BITUMINOUS.

The Scott Haven mines on both sides of the river are running along smoothly giving employment to a large force of men. The price of mining along this road is on the Tribunal basis—3½ cents per bushel. Several of the mines are idle at present, on account of the companies offering a reduction to three cents per bushel. The Shaner station mine, Lattimer's slope, and the Armstrong mine are idle on this account. The Sewickley mines of the Penn Gas-Coal Company are running along as usual. Bigley's mine is also running, but not with a full force of men.

The West Newton mine, better known as the West Newton shaft, is running along steadily, employing 80 men, paying 91 cents per ton, which is equivalent to 3½ cents per bushel. It is shipping considerable coal as well as doing quite a local trade from the platforms. A large number of the Baltimore & Ohio locomotives also coal here. This is one of the best gas-coal mines along the road. It has opened a new shaft on the opposite side of the river. The coal was reached at a depth of 76 feet, and connection made with the old mine. A large engine-house and tipple are almost completed, and sidings are being put in from the Pittsburg, McKeesport & Youghiogheny Railroad, over which the products of this mine will be shipped West, while the greater portion of the products of the old shaft will be shipped East over the Baltimore & Ohio road. Arrangements are making for doing a large business this spring.

The Leechburg Colliery Company and Pittsburg & Kiskiminetas Coal Company have not been running over half-time. Cause, no orders for coal. One year ago, these same mines were overrun with orders, shipping 50 cars per day and employing 350 hands. Now they are only shipping about 20 cars per day, and employing, or rather have, 150 miners.

COKE.

A movement is on foot at Pittsburg to form a coke pool on the same basis as the railroad pools, for the purpose of obtaining increased and uniform prices. The Frick Coke Company, Schoonmaker & Co., McClum & Co., and the Connellsville Coke and Iron Company, owning two thirds of the 9000 ovens, are at the head of the movement, and the other operators are expected to join. The selling price of coke is now from 95 cents to $1 per ton. The operators claim that prices should be advanced twenty-five per cent.

On January 8th, a meeting of the stockholders of the Redstone Coke Company was held in the company's office at the mines, and it was decided that the affairs of the company be brought to a close. J. M. Thompson and P. H. Moore, of Uniontown, and Welty McCullough, of Greensburg, were appointed trustees to perform the work.

The work of the Westmoreland Coal Company, at the southern end of Irwin, is nearing completion. The shaft has been sunk to the required depth, and the lining is being put in. The boilers and pump have been erected, and the fan engine will soon be in position.

The shaft of the Port Royal Coal and Coke Company, at Port Royal, has not

been doing much the past month. The works are in good order, and will be ready to ship largely when trade revives in the spring. The company has just completed the sinking of another shaft on the opposite side of the river, connecting underground with the works on this side, and is building tipples, engine-house, etc., and putting in sidings ready to ship coal over the Pittsburg, McKeesport & Youghiogheny Railroad, which will give two railroads to run the coal over. No doubt this company will ship a large amount of coal this summer from these two mines. The Smithton mine, a short distance above, has been running slowly this winter, but is improving now.

UTAH.

An attempt has been made to open the Utah Central Company's Pleasant Valley coal mine, which has been closed since the fire which occurred recently. An entrance was made and the mine partly explored, when the heat from the fire, which is still burning, drove the explorers back.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

The reports of the work done by the various mines in this district during the past year show results that indicate a long period of prosperity in the future. The most important event that took place in the camp seems to have been the completion of the Contention pumping machinery and the subsequent draining of Contention Hill. All the silver and gold produced to that date in this district has been derived from ores above the water-level.

At the present, the pumps of the Contention Company continue to easily control the water, running at the rate of fully five strokes per minute. The bottom of the shaft is kept dry and is rapidly pushed down, having been sunk about 80 feet since the pumps were started. Recent developments on the 400-foot level have brought to light one of the largest ore-bodies yet discovered in this mine; it is said to be 700 feet in length and about 40 feet wide. As the workings on the lower levels have not reached it, its depth is unknown. The mine continues to produce its regular daily shipment of 75 tons, and the mill at Contention City is kept constantly at work. The production for the past year amounted to nearly a million dollars; $437,500 were paid in dividends; and $300,000 for the pumping machinery. The company at the beginning of the year also purchased the Sulphuret mine. Altogether, the outlook is more favorable than at any other time in the history of this mine. It is interesting to note with these glowing reports, which are based on facts, that the original price paid to the locators in 1880 was only $10,000.

The Tombstone Mining and Milling Company—the pioneer company of the district, as it is termed—owns the Tough Nut, Good Enough, West Side, and Lucky Cuss. The West Side, at present the principal mine of the group, and one of the largest producers in the district, was thoroughly developed during the past year. At the two shafts, sinking continues, and no trouble with the water is experienced. Reports just received state that three hitherto unknown ore-bodies have been discovered on the 500-foot level. As yet, only one of these bodies has been opened; this one so far is 40 feet long and 8 feet wide, and the work is all in ore—the extent of the body unknown. At the Good Enough, operations were suspended, owing to a lawsuit with the owners of the Way Up, and little work was done on the Tough Nut. At the Lucky Cuss, however, work continued.

The furnace and concentrators at Charleston are working smoothly and continuously. The company purchased during the year the Gird twenty-stamp mill, the original ten-stamp mill not having the capacity to treat all the ores. The official reports of production have not yet been received; but it is estimated that 16,322 tons of ore were produced, giving a value in gold of $60,313; silver, $611,084; and lead, $30,936. The amount paid on the company's indebtedness during the past year was $100,000, leaving now due $311,000.

At the Virgina, work is carried on by a few men, prospecting for new ore-bodies. The company started out with a great noise; but during the past year, and even longer, silence has been practiced. The stockholders, who were at the time jubilant over the payment of a few regular dividends, have abundance of time to study the reason of the cessation of dividends. But the subject is too gloomy for further attention, and hence we turn to a company with a more brilliant record, the Grand Central Mining Company, which expended at least $400,000 before any returns were obtained, and has been very successful. It is estimated that since March, 1881, over $3,000,000 have been produced in bullion. The company being a close corporation, it is difficult to obtain detailed figures and statements. The property comprises the Grand Central, South, Grand Dipper, and Emerald. These mines are all worked, and show favorable prospects. At the Grand Central, the pumping machinery works in harmony with that of the Contention. The pumps are gradually overcoming the water. When they have entirely done so, sinking in the main shaft will be resumed.

The property of the Rattlesnake Mining Company, composed of Chicago capitalists, consists of the Rattlesnake, Mammoth, and Bunker Hill mines Work was begun in March last, and will be actively prosecuted. The ores in character are mostly chlorides, now and then associated with oxides of manganese, and average $54 to the ton, improving materially in grade as depth is attained. No dividends have as yet been declared, all superfluous money being invested in prospecting and developing the mines. The capacity of the present mill at Watervale being only 15 tons per day, the owners are contemplating the erection of a new mill, located at the mine, with a crushing capacity of at least thirty-five tons of ore a day. After the erection of this new mill, which will materially reduce the cost of treatment of the ores, mining on a larger scale will be commenced. The bullion production is estimated to have amounted to $98,000.

A Boston organization, known as the Boston & Arizona Smelting and Reduction Company, owns the Knoxville or Stonewall mine. Various developments have been made. The double-compartment shaft has attained a depth of over 200 feet. The tunnel west of the shaft is in 300 feet mostly in ore. The mine and mill, owing to pending lawsuits, were closed from July to November; nevertheless, 3150 tons of ore were produced, yielding in silver $198,450.

The Luck Sure mine, adjoining the Lucky Cuss, on Lucky Cuss Hill, had not been worked for some time. The former owners thinking the ground valueless, in August, 1882, it passed into the hands of the present owners, who have since pushed work vigorously. They have now opened a strong vein, running diagonally through the entire length of the claim, showing itself at a depth of 120 feet to be fully 25 feet between walls. In addition to this, two chimneys or chutes of manganese ore were uncovered on the northwest corner of the claim; and still farther south, a third one, similar in character, but carrying more lead. On these different ore-bodies, some 300 feet of shafts have been sunk, and about 400 feet of drifts run, with very satisfactory results. Work has been confined to shaft No. 3 since April last. The ore produced gave a bullion value of $35,911. This amount has paid all expenses and left a balance for the work of further developments.

The difficulties of the Girard Company, which was incorporated in 1879, and was very successful for the first two years, is attributed by local papers to the mismanagement of the financial affairs. Work was resumed three months ago, and the prospecting and developments since made would permit work on a large scale. The company's twenty-stamp mill has been idle for two years.

On account of being down to water-level, no work has been done lately on the Contentment, the property of a Boston corporation. The mine is now thoroughly drained, and the resumption of work is looked for. At the Little Wonder, a fractional claim of the Good Enough, work was resumed in December. But little work has been done on the Mayflower, which is said to be a promising property. At the Gentile Belle, work has been crowned with success. The property is owned by San Francisco capitalists. The recent strike in the Silver Thread mine has caused considerable excitement, and development-work is pushed forward. The ore at the Silver Belt and Cincinnati being low grade, it can not be worked with profit at present. As soon as the pending lawsuit of the Way Up Company with the Tombstone Mining and Milling Company has been settled, the owners intend to work the mine on an extensive scale. Chloriders have been doing a little work, producing 550 tons; yielding in gold and silver $6250. Arrangements are making for the resumption of work at the Gilded Age. Chloriders here have also been doing a little work during the past year. The ore produced was sold to the Woronoco Smelting Company. This company owns the San Diego mine, which is developed by a 500-foot shaft. The company erected in the spring a water-jacket furnace of the latest pattern; but on account of scarcity of flux, it ran but three months, with satisfactory results, however. About $20,000 worth of bullion was produced, most of which was shipped to the refining-works at Kansas City. In connection with the furnace, a complete plant for the refining of base bullion was erected. It consists of two cupel furnaces of the English pattern. They were only a short time in operation, fuel and skilled labor being too expensive in this section to compete successfully with the large refineries in the East. A very desirable grade of iron ore for fluxing purposes has been obtained lately, and the furnace will start working again before long.

The Black Top, Rose, Daisy, Prompter, Aunt Sally, C. O. D., St. Elmo, No Account, Marie Louise, Addie, Blue Monday, Ingersoll, State of Maine, Silver Bell, Ground Hog, Old Guard, Randolph, and Mountain Maid have been steadily worked, and many of them with favorable results. The Eden Lass, La Grande, Thunderbolt Consolidated, Alps, Blue Top, and Helen M. have stopped working for various reasons; but it is expected that work will be resumed on all in the near future. The Sidney, which lies parallel with the South Extension of the Grand Central, is under a bond to that company. The ore-body is said to be twelve feet wide. The above figures show that 1034 tons of ore, giving a value of $3,020,913, were produced. These figures are not official; but the estimates have been so carefully made that the difference can not be very great.

MOHAVE COUNTY.

MATHILDE.—Several months ago we referred to this company's operations. The San Francisco *Stock Report* now gives further information. It states that a 30-ton smelter is erecting, which will soon be in active operation. Three hundred and twenty-five tons of English coke are now in process of delivery at the smelter. A contract has been let for hauling ore to the smelter. There is an abundance of ore already mined and ready for the smelter. Fifty thousand dollars have been expended by the company in purchasing coke, the smelter, building roads, and in developing the mine. The work of development is rapidly and systematically pushed. The company, it is stated, has no indebtedness whatever.

PIMA COUNTY.

QUIJOTOA.—Messrs. Flood and Mackey, of San Francisco, who recently purchased these mines, have now filed articles of incorporation of four companies, namely, the Peer, Peerless, Combination, and Weldon. The capital stock of each is $10,000,000. The officers are James L. Flood, President; George R. Wells, Secretary of all the companies. The objects, the articles of incorporation state, are to mine for and reduce ores in Pima County.

YAVAPAI COUNTY.

HOWELL SMELTING AND MINING COMPANY.—The Prescott *Miner* states that the announcement that attachments had been placed on the company's smelting works aggregating over $20,000 occasioned general surprise, as the company was usually regarded as one of the most prosperous operating in the territory. An investigation disclosed the three following attachments: Blake & Co., $6000, for money advanced from July 1st to December 31st, 1883; Bank of Arizona, $8127.75, for money advanced from July 1st, 1882, to December 30th, 1883; M. Goldwater & Son, $6000, for goods purchased and money advanced from July 1st, 1883, to January 1st, 1884.

CANADA.

PROVINCE OF NOVA SCOTIA.

The total yield of the gold mines of Nova Scotia during 1883 was 14,800 ounces, the value being about $300,000. The highest yield in any year was in 1866, 27,314 ounces, and the lowest in 1874, 9140 ounces.

GALLIGHER.—Two hundred and eight ounces of gold were recently brought to Halifax from these mines at Isaac's Harbor. It was the product of thirteen days' work of the mill-run with a ten-stamp crusher from last month's work. The output last year averaged over three and a half ounces to the ton, and the lead seems to be improving the further it is worked. At present, there are about thirty-three miners employed.

COLORADO.

CHAFFEE COUNTY.

Eight hundred and sixty-four acres of State lands, situated near Granite, were recently sold at three dollars per acre.

CLEAR CREEK COUNTY.

LITTLE MATTIE.—The production of 1883 was 1800 tons of ore, valued at $51,971. The developments show that five hundred and fifty feet of drifts were run, all thoroughly timbered, with three ore and three rock chutes, cars, tracks, etc., complete. A hundred and fifty thousand feet of ground were stoped out, and all the buildings and machinery changed. A new road was built and sundry other improvements were made.

GILPIN COUNTY.

RARA AVIS.—This company of Philadelphia has filed amended articles of incorporation with the secretary of state. The capital stock of the company is $4,000,000.

JEFFERSON COUNTY.

MINERS' SMELTING AND REDUCTION COMPANY.—These works, situated at Golden, will pass into the hands of the Boston & Colorado Smelting Company on the 1st proximo. The furnaces cool down for a final clean-up on the 20th instant. It is understood that the McNair furnaces that have been in use at these works will be dismantled and removed.

LAKE COUNTY.

From the Leadville *Herald* we take the following:

CHRYSOLITE.—The shipments of iron ore from this mine have been suspended for some time. The tonnage of this property has been materially reduced, and the production this month will not exceed 250 tons. Prospecting continues through the various portions of the mine, and occasional good pockets of ore are met with. One of these was encountered on the second level recently. The mineral consists of a brown sand, running 25 per cent in lead and quite high in silver, showing some chloride of silver. The extent or value of the new pocket has not yet been determined.

DUNKIN.—Notwithstanding the great amount of preparatory and dead-work done in this mine during December, more than enough ore was extracted to pay all expenses. The ore now extracted is obtained on the lower level, about one hundred feet northeast of the old main working-shaft. Some good ore is also secured through the old workings of the mine, near the center of the property. Included in the new exploration-work in progress in the mine is the extension of a prospect-drift, on the third level, toward the Matchless line, in which some pockets of very good ore have been encountered. The drift is in fine iron ore.

Another portion of the mine has recently disclosed ten feet of excellent iron ore. A number of analyses have been made on this ore, returning on an average fifty per cent in iron, twelve per cent of manganese, and showing only from two to four per cent of silica. The ore carries from six to twelve ounces in silver to the ton.

LITTLE CHIEF.—At this mine, considerable work is doing. The northern portion of the claim is worked, utilizing the Daly and No. 6 shafts. The southern portion of the claim has been leased. The lessee has uncovered an old shaft sunk in 1879, before the present company secured the property, and which has been closed ever since. The shaft having produced some ore in 1879, it is reasonable to anticipate that the workings extending from it still contain ore that will pay handsomely at the present charges for smelting. That portion of the old workings of the Little Chief mine opened by shafts Nos. 3 and 4 has also been leased, and work begun with encouraging results. The lessees of the old waste ore-dumps on the mine have quite a force at work, and are sorting out considerable ore of shipping grade.

MIKE & STARR.—Ore-shipments have been resumed. The property has been worked for a number of years with varying results, and at times produced considerable sulphide ore of low and medium grade. The mineral body recently opened consists of oxidized and carbonated ores, from which the more refractory elements have been eliminated, making it a quite docile ore for reduction, compared with the former productions of this mine.

SMUGGLER.—This company is threatened with a lawsuit, the result of encroachments on the Iron Hill Consolidated Mining Company's property, by the lessees of the Smuggler.

PUEBLO COUNTY.

PUEBLO.—At a stockholders' meeting of this smelting and refining company, held at Pueblo, January 16th, the stock was increased from $750,000 to $1,000,000, for the purpose of enlarging the capacity of the works.

SAGUACHE COUNTY.

REVENUE.—Active preparations are making by this company to start work on the Revenue mine, which adjoins the Bonanza and Cornucopia on the opposite side of the main Kerber Creek. The shaft is down 140 feet, the vein being nearly 6 feet wide, with a pay-streak of from 6 to 15 inches, which mills from 35 to 50 ounces silver, with from 35 to 65 per cent in lead.

SUMMIT COUNTY.

COLORADO LAND AND MINERAL COMPANY.—This company has been employing from 50 to 100 men for the past two years in developing its property on Fletcher Mountain, Summit County, but has suspended operations, the result of the adverse decisions in the United States Circuit Court at Denver upon the title to the Maximus and Bernadotte lodes. When the company will start up again is a serious question, as we understand it is not satisfied with the interpretation of the law by the court. It may be correct, but it has not the indorsement of some of the best legal talent in Colorado. Should the company decide to take the case to the United States Supreme Court, it may be years before a decision will be reached, and of course all work will be suspended in Summit County while waiting for the final result.

This will be a serious blow to Ten Mile and especially to Pollock District, as it deprives it of the revenue that would be derived from the working of these mines.

If the decision of the circuit judge should be sustained in the United States Supreme Court, it would take nearly half of the Maximus and Bernadotte claims, and that part which has thus far proved the most valuable to the Company, as the mineral on this portion of the developments averaged about 150 ounces silver, and from 1 to 2 ounces gold per ton; while the mineral on the undeveloped portion show assays from 10 to 30 ounces silver, which would hardly pay to work at that altitude, being over 13,000 feet high.

The Maximus and Bernadotte lodes were developed with a view to permanency, and it is said by those who are familiar with the property that there are few if any mines in Colorado that are equipped any better, or the work done more substantially than these mines.

The company seems to have been formed with an eye to the future, and not for speculation, as all its transactions would indicate; and now that it stops operations in Summit County, it is reported it may go on in Lake County, as they have a valuable patented claim on Fryer Hill, in California Mining District, and in the vicinity of the Robert E. Lee, Matchless, and other well-known mines, with a shaft down 250 feet, well timbered.

It has also a valuable galena vein in Chaffee County, which is patented, and which has a shaft on it exposing mineral running about 70 per cent in lead and about 30 ounces silver, so that what Summit County loses may be a gain to Lake or Chaffee counties, or both.

DAKOTA.

CLIMAX.—This mica mine has been sold for $30,000 to Pitcher Brothers.

ETTA.—According to local papers, the tunnel in Ohio mine has reached the ore-body, and the ore encountered is said to be of very high grade, which contains a high percentage of tin throughout. The work of development continues, and will continue until the reduction-works are erected, in order that the facilities for securing an ore-supply may be fully up to the capacity of the machinery.

FATHER DE SMET.—The superintendent, under date of January 4th, writes as follows: Inclosed find express company's receipt for bar No. 174, containing 928·15 ounces of gold, the result of the clean-up of the mill for the last half of December—making a total for the month of 1567·25 ounces. I was disappointed in not being able to make a better showing for December account, but the grade was too low for us. The open cuts seem to be improving in quality, and I think better results will be obtained this month, though we may have some difficulty in doing much outside work on account of the severe weather. The underground outlook remains about as usual, showing plenty of ore of average quality. Altogether, the outlook for the mine is encouraging, and will yield a good profit for 1884. The report of the mine from January 7th to January 15th shows ore extracted from the first, second, and third levels 2110 tons. Ore milled, 2100 tons. Golden Gate south header, third level, advanced 7 feet; total length, 68½ feet. Justice uprise, 4 feet. Rise up 50 feet.

MINNESOTA.—The near future will show an increased force and probably the erection of machinery for the treatment of ores.

SITTING BULL.—The suspension of work will continue until the litigation with the Richmond has been settled.

MAINE.

WASHINGTON COUNTY.

Mining operations have been carried on in Lubec more or less during the last twenty-five years, says the Bangor *Journal*, and a high grade of galena ore has been taken out in several places. At one of the mines, new operations have been recently commenced. The vein is four feet in width, with good walls, and a shaft is down to a depth of about seventy-five feet. The ore is galena, with a good percentage of silver. A new building is going up, and the latest improved machinery for concentrating the ore will be put in. If the character of the mine proves valuable upon further development, smelting-works will be erected on the property of the company in the future.

NEVADA.

The bullion yield for 1883 was $7,487,634.25, being the result of 370,381 tons and 109 pounds. The net yield upon which taxes were paid was $1,643,407.89, upon which the total tax collected was $57,572.40, of which the State received $14,790.52, and the counties $42,781.88.

STOREY COUNTY—COMSTOCK LODE.

There is nothing of importance from the various mines; work continues as usual.

CALIFORNIA.—The reports presented at the annual meeting of the stockholders, held in San Francisco recently, shows that the reopening of the levels connecting with the old slopes was not considered prudent, there being strong indications of fire existing at these points. Some work was done at the 2300, 2500, 2700, and 2900 levels, which gave, however, no important results.

No work has been done in the C. &. C. shaft during the past year, except necessary repairs. The pumping and hoisting machinery is in good order.

With the exception of the water encountered in C. & C. winze, the explorations during the past year have proved that the ground is comparatively dry. As soon as the connection between the C. & C. winze No. 2 and main 2900 south drift is made, a large piece of ground will be opened for further explorations. The report of receipts and expenditures for the past fiscal year shows:

RECEIPTS.

Balance on hand last annual statement	$25,177.40
Nevada Bank present overdraft	21,162.99
Assessments Nos. 6 (balance), 7, 8, and 9.	192,137.80
Ore account—Proceeds of ore worked jointly with the Consolidated Virginia and Sierra Nevada	686.99
Sutro Tunnel Company, for work performed	250.00
Proceeds of sales of company's stock	3,700.18
Total	$243,115.36

DISBURSEMENTS.

C. & C. joint shaft	$79,950.00
Salaries and wages	54,797.57
Supplies	20,138.51
Compressed air	22,209.73
General expenses	15,818.32
Company stock (assessments, advertising, and auction fees on 216,438 shares of stock bought in by the company for non-payment of assessments)	49,329.40
Cash on hand at San Francisco	446.90
Cash on hand at Virginia	397.45
Samples on hand and in Virginia	27.78
Total	$243,115.36

Attention is called to the fact that the total amount of these assessments was not collected. The amount uncollected is shown by the charge to "company's stock" under the head of disbursements.

SIERRA NEVADA.—The following officers were elected at the annual meeting held in San Francisco: Charles H. Fish, President; A. B. Hull, Vice-President; E. L. Parker, Secretary; D. B. Lyman, Superintendent; and the Nevada Bank, Treasurer. The superintendent's report shows that no work, except necessary repairs, was done at the 2300, 2400, and 2500 levels. At the 2700, 2900, 3000, and 3100 levels, development-work continued, and in some instances seams of gold-bearing ore, varying in value from $10 to $60 a ton, were found. The Sierra Nevada shaft is in good condition, but it is not used except for the passage of men and for the conducting down of the large compressed air-pipe which conveys the air to all points of working on the 2900 and 3100 levels of the mine. The shaft is an "upcast," and is the outlet of all the heated air from the deep workings.

At the Sierra Nevada, Mexican & Union shaft, no work has been done during the year except keeping up the necessary repairs. The flow of water which the pumps handle remains without any particular change. The financial statement shows:

RECEIPTS.

Cash on hand last annual statement	$50,234.82
Balance of assessment No. 75, levied December 8th, 1882	12,260.00
Assessments Nos. 76 and 77	200,000.00
From other mines for labor and supplies	40,092.68
Sale of Eureka mill and supplies	25,370.35
Total	$327,957.85

DISBURSEMENTS.

Salaries and wages	$107,620.95
Mine supplies	23,824.19
Wood	60,369.75
General expenses	46,607.00
Sierra Nevada, Mexican & Union Shaft Company, one third expense	89,410.59
Total	$327,832.48
Cash on hand	125.37
Grand total	$327,957.85

PENNSYLVANIA.

A special term of the court has been called in Forest County to try a great ejectment case and decide the ownership of a valuable tract of oil territory situated in Home township, containing 600 acres. There are on the property at least ten first-class producing oil-wells, and the oil already produced in the hands of a receiver is estimated at 200,000 barrels. The history of the case is of great length, the present litigation dating back to the year 1827, when the property was of little value and sold to pay the taxes. The claimants are C. E. Clark and Leroy Judd, of Leadville, Colo., and the defendant in the ejectment proceeding is the Balltown Oil Company. The value of the property in dispute is a half-million, according to press dispatches from Pittsburg.

UTAH.

EMERY COUNTY.

This county, one of the youngest in the territory, says the Salt Lake *Tribune*, is assuming considerable importance as a mining country. It has vast fields of the finest coal extending for miles, cropping out in cañon and plain; mineral wax and rich shales in abundance; marble and fine building-stone. Recently silver-sandstone, similar to that found at Silver Reef, has been found, and a test lot will be sampled in Salt Lake. The weather is mild and pleasant, so that prospecting can be carried on uninterruptedly all winter. The coal-veins are from four to twenty feet thick, and the coal is fully equal if not superior to the Pleasant Valley, which sells so readily in Salt Lake.

WEST VIRGINIA.

A correspondent of the Philadelphia *Press* states that a syndicate of wealthy Pennsylvanians, antagonistic to the Standard Oil Company, has purchased 300,000 acres of land in the West Virginia oil-belt, and proposes in the spring to begin sinking wells in series of twenties, each experiment representing an investment of $100,000. This new field would have the advantage, especially in the Western trade, of cheap water transportation and a further saving in the cost of production as compared with the thickly-drilled Pennsylvania region. The syndicate has already secured much land. A railroad running from Wheeling southward along the Ohio River is now tapping the region of the purchase made by the Pennsylvania syndicate, which has not less than half a dozen navigable streams emptying into the Ohio. Water as well as rail transportation is thus offered for the products of timber and oil.

WISCONSIN.

BLACK RIVER FALLS.—This company, which has recently been incorporated, proposes to conduct a general business in the manufacture and sale of charcoal and pig-iron. The capital stock is $100,000, divided in 2000 shares of $50 each.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Jan. 25.

The Bodie stocks continue to be the principal feature of interest in the mining market, and although they suffered a strong decline this week, they are still quoted at very high figures. Bulwer was very much sought after and sold at strong prices. There was but little of interest outside of the Bodies. Horn-Silver was strong, as was also Iron Silver. Green Mountain showed some weakness, while Navajo was quite weak. Harlem and Sonora were very largely dealt in, but remain about steady in price. Robinson was quiet and steady. We give a complete summary of the market below. The total number of shares sold aggregates 132,809, as against 74,890 last week.

The Comstock shares record no change from our last, but remain quiet and steady. California was weak under a small business, selling from 12@5c. Consolidated Virginia was fairly dealt in, and was a little weak; it sold from 35@30@31c. Sierra Nevada records a small business at steady prices, selling from $2.65 $2.75. Union Consolidated sold at $2.65. Consolidated Imperial records but a small transaction at 7c. Sutro Tunnel was quiet and steady, selling from 17@16c.

The Bodie stocks were very actively dealt in, but suffered a sharp decline and were weak. Bodie Consolidated declined from its strong prices and was weak under an active business; it sold from $13 @$7@$9.13. Bulwer continues strong and was very actively dealt in; it sold from $1.35@$2.30@ $1.95, with a business of 17,230 shares. Standard was active and weak, selling from $7.25@$6.50@ $6.75. Bechtel sold at irregular prices, being quoted at 40@32@34c. Goodshaw was weak, selling from 50@20c., with a small business. Tioga was also weak, under a fair business, declining from 50@25c. North Standard was moderately dealt in at irregular prices, selling from 27@8@15c.

The Leadville stocks were also quiet and steady. Amie sold from 9@10c., with a small business. Chrysolite was a little weak, under a small business, selling from $1.20@$1.10. Dunkin sold at 20c. Iron Silver was actively dealt in and was strong; it sold from $2@$2.15@$2.10. Leadville was quiet and steady at 45@50c. Little Chief was moderately dealt in and was steady; it sold from 50@54c. Little Pittsburg sold from 40@45c., with a small business. Climax was quiet and steady at 6c.

The Tuscarora stocks were very quiet. Grand Prize sold at 20c. Belle Isle was quiet and steady at 15@30c. Navajo was quite weak, declining from $3.25@$2.40, with a fair business. Independence sold at 40c.

In the miscellaneous list, Bassick records one transaction to-day at $7. Eureka Consolidated was steady, with a small business, selling from $1.80@$2.25. Green Mountain was a little weak under a small business; it sold from $1.90@$1.75. Hall-Anderson was quiet and weak, selling from $1.30@$1.05@$1.10. Homestake sold from $9.75@$10, with small transactions. Horn-Silver was fairly dealt in at strong prices; it sold from $6.63@$7.25. Northern Belle was quiet and steady at 50@45c. Robinson Consolidated sold from 28@30c., under a small business. Sierra Grande was quiet and steady at 80c. Silver King was moderately dealt in and was weak, selling at $6.75. Stormont sold from 17@15c., with a small business.

Barcelona was quiet and steady at 13@14c. Central Arizona records a fair business at stronger prices; it sold from 23@28c. Decatur was active and steady at 5@4c. Durango sold from 3@4c. under a small business. Harlem was very actively dealt in at irregular prices; it sold from 13@9@10c. La Crosse was quiet and steady, selling from 8@10c. Oriental & Miller sold from 10@12c., with a small business. Sonora Consolidated was very actively dealt in at steady prices; it sold from 9@13@12c.

An adjourned meeting of the stockholders of the Hibernia Silver Mining Company was held in this city last Saturday, to further consider the question as to whether the contribution of fifteen cents per share and share for share of the old Hibernia Consolidated Mining Company's stock should be returned, and the new company abandoned. It seemed to be the opinion of those present that it was best to dissolve the new company, and to return the contributions and old stock, and the directors were ordered so to do. We understand that the old company will continue the fight in the courts to regain possession of its property.

MEETINGS.

The following companies will hold their regular annual meetings of stockholders for election of trustees and officers at the times mentioned:

The Chestatee Gold Company, No. 140 Nassau street, New York City, January 29th, at one o'clock P.M.

The Colorado Smelting Company, No. 18 Wall street New York City, February 11th, at noon.

The Delphic Iron Company, No. 20 Nassau street, New York City, February 12th, at three o'clock P.M.

The Father de Smet Gold Mining Company, office of the company, at San Francisco, Cal., February 7th, at twelve o'clock M.

The Huntington & Broad Top Railroad and Coal Company, No. 417 Walnut street, Philadelphia, Pa., February 5th, at twelve o'clock M.

The Iron Cliffs Company, No. 52 William street, New York City, February 12th, at eleven o'clock A M.

The Landon Hill Mining and Manufacturing Company, No. 62 William street, New York City, February 26th, from one to two o'clock P M.

The Maryland Coal Company, No. 104 Broadway, New York City, February 5th, at eleven o'clock A M.

The Montezuma Copper Mining Company, No. 12 Cliff street, New York City, January 31st, from twelve o'clock M. to two o'clock P.M.

The Princeton Mining Company, No. 67 Wall street, Room 8, New York City, February 2d, at noon.

The Tremont Coal Company, No. 227 South Fourth street, Philadelphia, Pa., February 5th, at twelve o'clock M.

The Ward Consolidated Mining Company, No. 2 Wall street, New York City, February 12th, from two to three o'clock P.M.

DIVIDENDS.

The Fulton Coal Company has declared a dividend of five per cent on the stock of the company, payable on and after the 22d inst.

The Ontario Silver Mining Company, of Utah, has declared a dividend (No. 91) of $75,000, payable January 31st. Total amount of dividends to date $5,225,000.

The New Central Coal Company has declared a dividend of $1 per share, payable February 12th.

The Quincy Mining Company, of Michigan, has declared a dividend (No. 31) of four dollars and fifty cents per share, payable February 20th, to registered holders January 30th.

PIPE LINE CERTIFICATES.

The oil market this week has been rather dull and unsettled. Opening on Saturday last at $1.09⅝, it rose to $1.09⅝, and then declined to $1.08, closing at $1.08⅛. On Monday, the market was weak. Tuesday was but a repetition of Monday, and the market was in a very unsettled condition. On Wednesday, there was a better feeling, and the market rallied and was strong, closing steady. Thursday, the market was again strong, and prices ruled upon a better basis. Business was rather dull, however, and was mostly confined to local trading. To-day (Friday) the market was stronger, and closed with a better feeling.

The only news from the oil regions was the report of the production of the new Porcupine No. 16 well which is situated in a region that has been carefully drilled and which has opened numerous large wells. Notwithstanding this fact, this new venture yielded but 48 barrels in the first sixteen hours.

Carrying rates are about 40 cents. This indicates the existence of a large short interest, unless the scarcity of certificates is somewhat fictitious. Bears are not quite so much tempted to short the market as they would be were rates for carrying higher.

Refined remains unchanged at 9⅛c. per gallon.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Jan. 19	$1.09⅝	$1.09⅝	$1.08	$1.08⅛	4,934,000
21	1.08⅛	1.08⅞	1.07⅛	1.08⅜	5,563,000
22	1.08¾	1.09⅛	1.07¾	1.08⅜	5,154,000
23	1.08¾	1.10⅛	1.08¾	1.09⅛	7,931,000
24	1.09⅞	1.10⅝	1.09¾	1.09⅝	4,875,000
25	1.10¼	1.10⅞	1.10	1.10⅜	5,959,000
Total sales					34,416,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Jan. 18.	Jan. 19.	Jan. 21.	Jan. 22.	Jan. 23.	Jan. 24.
Albion	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Alpha	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Alta	$1⅞	$1¾	$1⅞	$1½	$1⅝	$1½
Argenta	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Bechtel	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Belcher	1	.. ..	1⅛	.. ..	1	.. ..
Belle Isle	.15	.. ..	.25	.15	.15	.15
Best & Belcher	2⅝	2¾	2⅞	2¾	2¾	2¾
Bodie	12¼	11½	10⅝	9¼	8	9
Bullion	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Bulwer	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
California	.10	.05	.05	.05	.05	.05
Challar	2⅜	2¼	2⅛	2⅛	2⅛	2⅛
Con. Virginia	.35	.30	.30	.30	.30	.25
Crown Point	1	1	1	1	.. ..	1
Elko Cons	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Eureka Cons	1⅞	.. ..	.. ..	.. ..	2¼	2¼
Exchequer	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Gould & Curry	1⅞	1⅞	1⅞	1⅞	1⅞	2
Grand Prize	.25	.25	.20	.20	.15	.15
Hale & Norcross	1⅞	1¾	1⅞	1⅝	1⅝	1¾
Independence	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Martin White	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Mexican	1⅞	2	2	2	2	1⅞
Mono	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Mount Diablo	.. ..	2¾	.. ..	.. ..	.. ..	.. ..
Navajo	3	3	2¾	2¼	2⅜	2¼
Northern Belle	.45	.45	.40	.40	.45	.50
North Belle Isle	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Ophir	3½	3⅜	3⅜	2¾	2½	2½
Overman	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Potosi	.90	.70	.80	.70	.70	.70
Savage	.95	.85	.90	.90	.80	.85
Scorpion	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Sierra Nevada	2¾	2¾	2¾	2⅝	2¾	2¾
Silver King	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Tip Top	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Union Cons	2½	2½	2½	2⅜	2½	2⅜
Utah	1¼	1½	1⅜	1¼	1¼	1⅛
Wales Cons	.. ..	.. ..	.. ..	.. ..	2¼	.. ..
Yellow Jacket	2⅜	2¼	2¼	2¼	1¼	.. ..

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, January 24.

The market for copper stocks the past week has shown a good degree of activity, but at lower prices. There have been larger offerings of stock, due probably to the fact that stocks carried on margins have been thrown on the market to be sold at the best prices to be obtained, and buyers have taken advantage of this to get in a line of good stocks at reasonably low prices. Calumet & Hecla was forced down early in the week to $230½, but has since rallied, and is quite steady at $232. Franklin was quite firm at $9¾ in the early dealings, but a block of 500 shares was put upon the market to-day which sold at $9, which shows a good degree of confidence in this mine. Quincy declined from $46@$43, with later sales at $44. The announcement of a dividend of $4½ per share, payable next month, doubtless is the cause of the decline, as it was generally anticipated that it would be at least $5. The mine is looking well, and shows a handsome surplus after paying this dividend. Atlantic declined from $10 (December 20th) to $7½ ex dividend. Osceola, on a sale of 5 shares, declined from $16½@$14 Pewabic also declined from $1½@$1¼. The sale of delinquent stock takes place to-morrow, and buyers are holding off to get this stock at a lower price. A sale of 200 shares of Allouez at 50c. is reported to-day The last sale was at $1½, October 29th.

In silver stocks, at the regular Board, there is nothing doing. A small block of Catalpa, sold at 30 cents, and a few hundred shares of Bonanza Development at $1⅝@$1¼, comprise all the transactions. At the Boston Mining and Stock Exchange, there has been considerable activity in Empire at 35@37½c. Bowman Silver is moderately dealt in, and is quite steady at 16@17c. Sullivan is weak, and has declined to 72½c, sales, and closed 70c. bid, 75c. asked. The parties who have recently been bulling this stock seem for the present to have withdrawn their support, and the result is lower prices. Dunkin Silver is in fair demand at 24@25c. Massachusetts & New Mexico, once a favorite in this market, is now offered at 11 cents, assessment of 10 cents per share paid, without takers, and the stock is virtually out of the market, as no one seems disposed to take it and pay the assessment.

3 P.M.—At the afternoon Board, Calumet & Hecla sold at $232½@$232, closing $232 bid. Quincy, at $44, closing $43 bid, $44 asked. Huron, at $1⅛ for 50 shares. For Osceola, $12½ was bid, $15 asked.

Atlantic, offered at $8. Empire sold at 36@87½c., and closed 85c. bid. Bowman, 16c. bid. The rest of the market was unchanged.

BULLION MARKET.

NEW YORK, Friday Evening, Jan. 25.

The India exchange in London and sterling exchange here, having each advanced since our last postings, the rate for silver here has advanced accordingly as per figures of annexed table:

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Jan. 19	50¾	110¾	Jan. 23	50⅞	110⅞
21	50¾	110¾	24	51	111⅛
22	50⅞	110⅞	25	50 15-16	111⅛

BULLION PRODUCTION FOR 1883.

MINES.	States.	Month of December.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont		$885,934
*Alta-Montana, G. L. S.	"		$10,625
*Belmont	"		12,604
Bodie, G. S.	Cal	112,000	224,859
Bodie Tunnel, G.	"		52,742
*Bonanza King, G.	"		426,967
*Boston & Montana, G.	Mont		140,323
California, G.	Colo	18,000	222,359
*Central Arizona, S.	Ariz		35,845
*Christy, S.	Utah		236,600
*Chrysolite, S. L.	Colo	9,829	303,105
*Consolidated Bobtail, G.	Colo	10,341	116,229
†Contention, S.	Ariz		854,886
Crescent, G. S. L.	Utah		266,498
*Custer, G. S.	Idaho		43,572
*Deadwood-Terra, G.	Dak		388,582
*Derbec Blue Gravel, G. S.	Cal	19,304	147,323
Dunkin, S. L.	Colo		49,250
Evening Star, S. L.	Colo		47,061
*Father de Smet, G.	Dak	25,724	350,961
Freeland, G. S. C.	Colo		208,464
*Frisco M. and S. Co., G. S. L.	Utah		§77,084
*Granite Mountain, S.	Mont		323,523
Gunnell, S.	Colo	10,570	129,398
*Haile, G.	S. C.		37,942
*Head Center Consolidated	Ariz		45,340
*Head Center and Tranquillity	Ariz		89,108
*Hecla Consolidated, G. S. L.	Mont	**	633,979
*Homestake, G.	Dak		866,709
*Hope, S.	Mont		82,060
Horn-Silver, S. L.	Utah	276,000	3,253,200
*Howell S. and Mg. Co., G. S. L.	Ariz	11,238	205,190
Idaho, G.	Cal		150,642
*Independence, G. S.	Nev		32,991
*Iron Silver, S. L.	Colo		1 031,952
*Jocuistita, S.	Mex		‡258,959
*Kentuck, G. S.	Nev		20.550
*Lexington, S.	Mont	114,638	1,288,323
*Little Pittsburg, S. L.	Colo		87,552
*Marguerite, G.	Cal		74,622
*Martin White, G. S.	Nev		136,317
Morning Star, S. D.	Colo		84,428
Mount Diablo.	Nev	53,304	521,546
*Navajo, G. S.	"		411,642
*North Belle Isle	"		2,153
Northern Belle, S.	"	6,593	576,200
*Ontario, S. L.	Utah		1,807.178
*Oxford, G.	N. S.		54,055
*Phœnix, G.	N. C		21,009
*Final Consolidated, S. L.	Ariz		181,485
*Plymouth Consolidated, G.	Cal	76,714	527,170
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont		203,947
*Silver Cord, G. S. L.	Colo		972,567
Silver King, S.	Ariz		367,802
*South Yuba, G.	Cal	1,876	39,148
Standard, G.	Cal	70,000	1,104,685
Star, S.	Nev		27,095
*Stormont, S.	Utah		232,638
Syndicate, G.	Cal		66,238
Tintic M. and M. Co.	Utah	6,680	43,223
*Tip Top, S.	Ariz		37,868
*Tombstone, G. S. L.	"		664,618
United Gregory, G.	Colo		98,000
Wyoming Consolidated.	Cal		31,541
Yellow Jacket, S.	Nev		265,885
Total amount of shipments to date			$22,192,822

* Official. †Net value. ‡ Assay value. §Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (——) indicates that no shipments have been made in the month named. ** Silver valued at $1.10 per ounce.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains at 3 per cent. During the week, the bank gained £156,000 bullion, and the proportion of its reserve to its liabilities was increased from 40⅝ to 41¾ per cent, against 44¼ per cent at this date last year. The weekly statement of the Bank of France shows an increase of 4,425,000 francs gold, and of 3,750,000 francs silver. The Bank of England, January 24th, lost £15,000 bullion on balance.

METALS.

NEW YORK, Friday Evening, Jan. 25.

Copper.—There is very little doing, the manufacturers being well supplied, while, on the other hand, there is no pressure to sell in any quarter. We do not hear of any cheap lots of Lake, and it would be difficult to obtain any thing at less than 15c. Outside brands are quiet at 14½c.

We print elsewhere our usual annual review, with a preliminary estimate of production and export.

London cables to-day £55 17s. 6d. for Chili Bars and £61 10s. for Best Selected, figures which are lower than they were last week.

Tin.—There has been considerable business during the week at declining prices, being at the close 18⅝@18½c.

London cables to-day £82, a decline of £1 15s. during the week.

Lead.—The trade has been treated to one of its greatest surprises for many years. Surmises and queries in explanation of the transactions of the week have been exceedingly numerous, but have not resulted in throwing the faintest ray of light upon the mystery. In the first days of the week, the same party, a Western holder, who only two weeks ago bought heavily at 4·20@4·30c., and then advanced the price to nominally 4·50c., suddenly began to sell freely, placing a little at 4·25c., a few hundred tons at 4·15c., and a little more at 4·12c., but the bulk, 1500 tons in all, at 4c. The aggregate of the sales is said to have been 2500 tons. The motive in such a movement, resulting in a direct and immediate loss, is not understood. It has certainly had a very bad effect in creating the impression among buyers here that the situation in the West was found to be much more unfavorable when tested by this Western holder than was anticipated. As almost all of our large buyers took a share in the lead thus distributed, they are now for some time supplied, and will look with indifference upon the market. We quote nominally 4@4·10c. for Common and Refined.

We have returns of the production of all the desilverizing works in the country except one, the Pueblo works. Estimating the product of the refinery of this establishment at 6000 tons, the quantity of lead produced from base bullion was 123,752 tons, to which added the make of Missouri, Kansas, Illinois' and Iowa, and one or two scattered establishments, we reach a total of about 147,000 net tons, as the product of the United States.

From St. Louis, Messrs. John Wahl & Co. telegraph to us as follows:

Our market has declined slowly since our last report. During the latter part of last week, the market closed strong, with sales at 4c. Prices weakened during the early part of this week to 3·90, and since fell to 3·75c., which is now nominally quoted for Hard and Soft Lead. The speculative demand has disappeared.

From Chicago, Messrs. Everett & Post send us the following:

Our market is very flat and weak, absence of buyers having caused a decline. Prices are nominally 3·80c.

Spelter.—Our market is unchanged. Common Domestic is quiet and dull at 4·30@4·40c. England cables £14 15s. for Siberian spelter.

Antimony.—The market is fair and prices are unchanged.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Jan. 25.

American Pig.—The buying movement which began about two weeks ago has continued, being the usual covering of season contracts. The fact that it appears to be so general among consumers is a good indication that they do not look for lower prices. On the other hand, they need not fear any material or long-sustained advance, in view of the fact that there are quite a number of furnaces out of blast, ready to take advantage of any marked improvement in the trade. It is stated that the Thomas Iron Company has already on its books orders for 77,000 tons of pig-iron, the capacity being about 120,000 tons. Prices are unchanged. We quote Foundry, No. 1, $20@$22.50; No. 2, $18.50@$19.50; and Gray Forge, $17.50@$19. Bessemer pig is dull, holders asking $20. There is nothing to report in Spiegeleisen, which we quote $28.25@$28.50 for 20 per cent.

There have been no transactions at the Metal Exchange during the week.

Scotch Pig.—The market is firm and quiet, holders adhering to the recent advance.

We quote ex ship and to arrive: Coltness, $22.50@$23; Langloan, $22.50; Summerlee, $21.50@$22; Eglinton, $20.50@$21; and Dalmellington, $20.50.

At the Exchange, the following cable quotations were received to-day: Coltness, 57s. 6d.; Langloan, 54s. 6d.: Gartsherrie, 58s. 9d.; Eglinton, at Ardrossan, 46s. 9d.; and Warrants, 43s. 9d.

Steel Rails.—There is very little business to report, the mills being well supplied with orders, while nothing but small lots are in the market. We quote for such lots $35 at mill. Cables have come to this city yesterday and to-day, bringing the news that in England a combination has been formed among steel rail mills to advance prices and maintain them. This of course affects our market very little.

Old Material.—There is nothing of any account doing, Ts being quoted $21.50@$22 nominally.

Philadelphia. January 25.

[From our Special Correspondent.]

Pig-Iron.—Consumers of pig-iron are indulging in very vexatious delay, which makers explain by saying that the expected business at mills and foundries and other consuming establishments has not been received. Very little additional capacity has been put in operation for the past week, and hence the demand for crude iron is still irregular, and manufacturers are disposed to put off making purchases until the last possible hour. Foundries in this city are receiving a little more work. The foundries in adjoining towns report a little increase in activity, and the larger establishments are receiving good orders; but the improvement is not such as was expected. The improvement in iron has been very gradual; but such as it is, the trade is thankful for it. The rumors as to furnaces going out of blast are without foundation, as an equal number are blowing in, thus leaving production at a stand-still. The lowest price paid for foundry this week was $20 for No. 1. Very little is moving above $21. The special makes are nearly all well sold up. Two or three inquiries for Southern irons are in hand. No. 2 iron is weak and dull at about $19. Millowners have been buying small lots of from 100 t 250 tons each, in some cases, and there are negotiations now in progress for large lots. About $18 is the best price paid for a fair iron. Sales of 25,000 tons in large lots have been heard of this week, and two or three prominent brokers have inquiries in hand for from 6000 to 8000 tons more; but buyers insist upon the very inside prices.

Foreign Irons.—In the absence of important transactions, quotations may be repeated at $20@$21 for Bessemer, and $30 for Spiegeleisen. There are rumors of large transactions being probable in both these products, but they can not be traced to reliable sources.

Muck Bars.—Muck Bars are quiet at $32.50, and some parties are asking $1 more.

Blooms.—There is no change either in demand or prices this week.

Merchant Iron.—The only thing that can be said as to merchant bar is, that there is more inquiry, and it comes from greater distances. It is the opinion of manufacturers that buyers are now sounding the different markets, and that a heavy demand will soon be presented; but the probabilities are really against a very heavy demand for some weeks to come, notwithstanding the fact that the stocks in consumers' hands are very light. Fifty to 100-ton lots are asked for, and prices run from 1·75@2c., according to the quality of the iron. There is a better movement this week than last, and next week still larger quantities will be ordered, but the activity will not be any thing like what was expected. There are inquiries for heavy cable road requirements; and if these enterprises are pushed, heavy supplies will be ordered this season. It is given out that the construction of cable lines will be actively prosecuted this summer.

Nails.—There is an increased amount of inquiry for nails, and jobbers are buying in a retail way at $2.40@$2.55. Stocks are declining, and makers expect to enter the spring trade in good shape.

Plate and Tank Iron.—Quotations in Plate Iron are repeated at 2·25c. for Boat Plate, 2·30c. for Tank

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Jan. 19.		Jan. 21.		Jan. 22.		Jan. 23.		Jan. 24.		Jan. 25.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.					.10	.09	.10						2,900
Amie Con., Co.	.10												
Argenta, Ne.													
Bar. & Walker, Ut.													
Bassick, Co.											7.00		100
Belle Isle, Ne.			.18	.15							.30		300
Bodie Cons., Ca.	12.00	11.75	13.00	11.00	9.50		9.50	7.00	7.75	7.00	9.13	9.00	1,800
Breece, Co.													
Bulwer, Ca.	1.80	1.65	1.85	1.35	2.30	1.75	2.00	1.85	2.00	1.80	2.00	1.95	17,250
California, Ne.	.10		.12		.08						.05		1,600
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.									.06		.06		700
Castle Creek			.20								.15		600
Chrysolite, Co.	1.20	1.15	1.15		1.10						1.10		1,200
Cons. Va., Ne.	.35	.32	.30		.30				.31				3,950
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.							.20						200
Eureka Cons., Ne.	2.00	1.80					1.50				2.25		705
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.													
Gold Stripe, Ca.											.06		500
Gould & Curry, Ne.													
Grand Prize, Ne.											.20		100
Great Eastern, Dk.													
Green Mountain, Ca.			1.90		1.90	1.85	1.80	1.75			1.80	1.75	1,800
Hale & Norcross, Ne.													
Hall-Anderson, N. S.					1.30		1.20		1.05		1.10		800
Hibernia, Co.													
Homestake, Dk.			10.00				9.75		10.00				100
Horn-Silver, Ut.	6.88	6.75	6.75	6.63	7.00	6.75	7.25	7.00			7.25	7.00	2,205
Iukiili, Co.													
Iudependence, Ne.	.40								.40				400
Iron Silver, Co.			2.10	2.00	2.20	2.00	2.05		2.05		2.15	2.10	6,650
La Plata, Co.													
Leadville C., Co.	.45		.49				.50	.45					800
Little Chief, Co.	.50		.50		.50		.54	.53					2,100
Little Pittsburg, Co.	.45				.40		.40				.45		425
Martin White, Ne.							.50						100
Moose, Co.													
Navajo, Ne.			3.25		3.00	2.40	2.40						1,200
Northern Belle, Ne.							.50	.45					300
North Belle Isle, Ne.													
Ontario, Ut.													
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.	27.00		25.50	25.13									700
" Com., Ca.	5.00		4.50										200
Rising Sun, Ca.													
Robinson Cons., Co.					.30	.28	.30						1,800
Saint Joseph's Lead.													
Sava.,e, Ne.													
Sierra Grande, N. M.	.80		.80								.80		900
Sierra Nevada, Ne.					2.65						2.75		400
Silver King, Ar.					6.75				6.75		6.75		200
Spring Valley, Ca.													
Standard, Ca.	7.25		7.00		6.75		6.75	6.50	6.63		6.75	6.50	1,505
Stormont, Ut.					.17	.15							700
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Jan. 19.		Jan. 21.		Jan. 22.		Jan. 23.		Jan. 24.		Jan. 25.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alta-Montana													
American Flag			.08		.04								2,000
Barcelona, G.	.13						.13				.14		1,000
Bear Creek													
Bechtel Con., G.	.40		.35	.32	.34								1,350
Belvidere													
Best & B'licher, G. S.													
Big Pittsburg, S. L.													
Bradshaw, S.													
Buckeye													
" pref.													
Bull-Domingo, S. L.													
Bye and Bye													
Calaveras, G													
C'lav'r's W. & M. Co.													
Cal., G.													
Central Ariz'na, S.	.25		.25	.23			.28	.26					3,800
Cherokee, G.													
Climax, Co.	.06				.06		.06		.06				1,700
Colorado Central													
Cons. Imperial			.07										200
Crowell, G.													
Dahlonega, G.	.01		.01		.02	.01			.01		.01		7,100
Decatur	.05	.04	.04		.05		.01		.04		.04		8,500
Dunderberg													
Durango, Co.	.03				.04						.04		2,500
Eastern Oregon													
Elko Cons.													
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G.													
Goodshaw, G.	.50	.40	.48				.35		.25	.20			2,100
Granville, G.													
Hariem M. & M. Co.	.12		.13		.14	.09	.11	.10	.11	.10	.11	.10	15,100
Hortense, S.													
Imperial													
Lacrosse, G.	.10	.09	.10	.08	.10		.09		.10				5,700
Lucerne													
Mariposa Prel. G.													
" Com., G													
Mexican, G. S.													
Miner Boy													
Mono					1.85				1.25		1.25		550
North Mexican													
North Standard, G.	.27						.10	.08			.15	.14	1,400
N. Hora-Silv'r, S. L.													
Ori'nt'l & Miller, S.					.11	.10	.12						800
Parnell													
Rappahannock, G.													
Red Elephant, S.			.05										1,000
Ruby, of Arizona													
Silver Cliff, S.													
Sonora Con.	.10	.09	.12	.10	.13	.11	.13	.11	.12				13,000
South Bodie, G.													
South Bulwer, G.													
South Hite													
South Pacific													
State Line, 1 & 4, S.													
" Nos. 2 & 3, S.													
Sutro Tunnel	.17	.16	.17		.17	.16			.16		.16		7,100
Tioga	.40	.35	.50	.41	.45	.40	.35		.25				2,700
Taylor Plumas													
Unadilla, S.													
Union Cons., G.	2.65												100

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 55,109. Non-dividend shares sold, 77,700.

BOSTON MINING STOCKS.

	Jan. 18.		Jan. 19.		Jan. 21.		Jan. 22.		Jan. 23.		Jan. 24.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez									.50				200
Amie									8.00		7.50		150
Atlantic													
Astec													20
Bodie Con.	11.50												
Bonanza D.	1.38	1.31			1.38		1 5-16		1.25		1.25		475
Bowman Sil	.16		.16		.17	.16							6,200
Bruns. Ant.													
Bulwer													
California													
Cal. & Hec.	232½	230½			232		232½		232		232½	232	36
Catalpa	.30						.30				.30		550
Climax													
Co. Virginia			.29										100
Contentm't.	.04												1,000
Copper F'lls													
Crescent													
"Cusi"													
Decatur													
Deer Isle													
Denver City													
Douglas													
Duncan													
Dunkin													
Elko Con													
Empire	.34	.32	.37½	.32	.40	.35							23,750
Eureka Con.	2.13	2.00											20
Franklin	9.75		9.75		9.75	9.50	9.50				9.00		820
Gila County													
Hancock C.													
Harshaw													
Horn Silver													
Huron			1.95								1.25		150
Independ'ce													
Indian Queen													
Mammoth													
Mass. & N.M.													
Milton													
National													
North Belle													
Ontario													
Osceola											14.00		5
Penn-Breck													
Pewabic	1.50		1.50								1.25		325
Pine Tree													
Plymouth													
Quincy	46.00	45.50	45.00		44.25	44.00			43.50	43.00	44.00	43.50	458
Ridge													
San Pedro													
S'ra Nevada													
S'ra Grande													
Silver Isles													
Silver King					7.25								10
Simpson Gd													
Sonora Con													
South Paci													
Standard													
Sullivan	.85		.83½										650
Sutro Tun.					.17								400
Sycamore													
Twin Lead													
Vizina													

PHILADELPHIA MINING STOCKS.

	Jan. 18.		Jan. 19.		Jan. 21.		Jan. 22.		Jan. 23.		Jan. 24.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.													
Argent			.21		.20	.19	.21		.21		.20		19,250
Arizona So.													
Battle Mt.													
Buena													
California													
Calista													
Chrysolite													
Cincinnati			.11	.10			.12						4,800
Comprom'e.			.30								.36		1,150
Contention													
Con. Virg.													
Dauntless	.01		.01				.01		.01		.01		15,400
Del Monte													
Denver City	.20				.20		.21		.21		.20		11,200
Eureka													
Girard													
Governor			.02		.02		.02		.02		.02		9,600
Grand Uni'n	.07	.06	.11	.05	.06		.05		.05				26,700
Green Mt.													
Gunnison													
Homestake													
Horn Silver													
Iowa Guich	.03		.03		.03		.03				.03		17,400
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd.													
Little Mn'd													
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan													
Navajo													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina													
Penn-Breck.											.04		2,100
Permanent													
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis													
Rara Avis E.	.06		.06		.06		.06		.06		.06		5,200
Record													
Rico Pion'r.													
Sierra Apac.													
Sierra Bella	.42	.40	.43	.41	.45	.43	.47	.46	.25	.24			7,600
Sierra G'nde	.82½	.80	.82½	.77½			.80	.70	.75	.72½	.72½	.45	6,500
Sierra Nev													5,145
Silver Cord.			1.02½		1.02½		1.05						1,400
Silver King													
Silv'r Plume													
Sonora Con.													
Standard													
Sultana													
Sutro Tun'l.													
Tombstone							.72½		.72½				800
Victor													
Yale Mt.													

2·75c. for Shell, 3·75c. for Flange, and 4·75c. for Fire box.

Structural Iron.—There is a stronger feeling in the market as regards the winter demand. Quotations are given at 2·25c. for Angles, 2·30c. for Bridge Plates, 2·75c. for Steel Plates and Tees, and 3·50c. for Beams and Channels. The plate and structural mill capacity in Eastern Pennsylvania is to be increased.

Wrought Pipes and Tubes.—A large amount of iron was inquired for this week, and business will probably be announced in a few days. Discounts on black pipe, butt-welded, 30 per cent; galvanized, 20 per cent; lap-welded black pipe, 50 per cent; and galvanized, 35 per cent. Discounts on lap-welded boiler tubes, 47½ per cent.

Steel Rails.—Notwithstanding the fact that quotations are continued at $35 nominally, contracts have been placed at more than $1 below this figure; but actual terms are private. The effort of makers to hold to $35 is evidently a failure, and all indications point to a continuance of December quotations for large lots.

Old Material.—Old Rails are quiet at $23; best offers heard of this week, $22. Bridge Rails would be bought at $23.25, but $24 is asked. One thousand tons of Crop Ends were ordered at $19.50. Cargo Scrap, nominally $22.50. No. 1 Wrought Scrap, $23.50, with very little business.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Jan. 25.

Anthracite.

The difficulty of moving coal in the harbor and other obstacles have made anthracite for immediate delivery scarce, and the price is now firm on the basis of $4.40@$4.50 for stove coal. The majority of buyers, however, provided themselves at the time of the recent activity, purchasing at about $4.20. The volume of business now doing is not very large, however, though considerable coal is delivered on old orders.

We print elsewhere, in full, Mr. Jones's interesting annual statement.

Bituminous.

There are indications that the struggle over the season contracts will begin earlier this year than usual. Already we hear it rumored that the Eastern Railroad has contracted with a Clearfield company for the year's supply at a low figure. There is the usual talk of an agreement between the Baltimore & Ohio and Pennsylvania railroads, but little confidence is expressed in the trade that any binding arrangement will be attempted. Current business is small and closely contested. We quote $3.85@$4.10 for Clearfield and $4@$4.25 for Cumberland coal.

Freights are favorable to buyers, being as low as $1.40 from Baltimore to Boston.

Philadelphia. January 25.

[From our Special Correspondent.]

A meeting will be held to-day, Friday, from eleven to twelve o'clock, at Third street and Willings alley, to fix prices. Old rates will be continued. Stocks at Port Richmond, Elizabethport, Perth Amboy, and stocks at the West at lake ports, are gradually depleted, not as rapidly as appears from some statements made, but still sufficiently so to strengthen trade, and give it confidence in firm prices to work upward in the way they have been doing for the past two weeks. Representatives of the coal interests said to-day that they find it less difficult to adhere closely to circular rates than for weeks and even months before; that the inquiries are of a character to justify their present course; that buyers are generally light in stocks; and that a steady demand is likely to continue from this time out. The exceptions to this rule are the cases of a few large buyers who come into market regardless of the possibilities of trifling changes. But the average buyers are still holding off, and virtually buying from day to day, not even filling up to their coal stocking capacity. They will follow this policy until spring, and unless frightened out of it by a still further advance, will wait until domestic demand declines, and until the downward tendency which usually shows itself in the spring is developed. A very careful survey of the situation of consumers has been made, and the companies are confident that they are pursuing the safest policy, and that restriction will enable them to command circular rates more easily as time goes on. Some special coals are selling at circular rates now, and it is likely that the list of these will be extended. There are some in favor of an advance now; but a conservative course will probably prevail. The Reading Company is adding to its possessions, and in a few days negotiations for one or two more collieries will probably be closed. A good deal of New England and Western inquiry is to hand this week. The line trade is but meagerly supplied. Local demand has been active all along. One or two companies are unable to fill the requirements of their customers in the line trade, and in the domestic sizes stocks are not at all abundant. There is a somewhat better prospect in manufacturing circles, but no very general improvement is likely to take place until about the middle of March. Some complaint is made as to the non-delivery of orders placed two or three weeks ago. Reports received to-day from Southern markets point to the probability of a better demand. Freights are rather high, and consumers will let stocks run very low before they will agree to pay present rates.

There is very little of interest to report in the bituminous coal trade. Some operators are entertaining great hopes of the benefits to be derived from the new line, and from the promised supply of cars which are now turned out by the car-works of this State. About 5000 additional coal cars have been contracted for so far this winter, and this will surely be enough to meet all requirements. Some few bituminous operators feel assured that the demand for soft coal this year will be enough greater than it was last year to absorb all the expected increase; but evidences of this are, at present, not very clear. No progress has been made in the efforts to organize the bituminous coal interests. The ground has been gone over and over, backward and forward, and ingenuity has been exhausted to devise some scheme by which competition can be arrested and production controlled; but none of the suggestions thus far has gained the assent of the coal interests. It is thought by some of the operators that the new line will help them out. Parties interested in the coal company formed by the Vanderbilt interests are sure that the development of that region will alter the conditions of the coal trade, and develop very active competition, resulting in the building up of an extensive coke industry, as the coal of that region is said to be very suitable for coking purposes.

Pittsburg. January 25.

[From our Special Correspondent.]

The coal trade at this point continues to be harassed by low prices, restricted demand, and labor issues, so that no very cheering report can be given to your readers.

Beginning with prices, I find no change from the old rate of 6 cents for railroad lump on the wall. Concessions from this figure are the rule rather than the exception. Steady cold weather has benefited yard demand, and there is a slight stiffening of values in this trade. Railroad pits are not averaging half-time, excepting in a notable instance. The exception is found in certain pits that are wholly ignoring the decision of arbitration and the award of the umpire. These pits, on Tom's Run, in the Pan-Handle field, are working full, paying only 3 cents per bushel for mining, or a half-cent under the umpire's price. About 60 cars of coal daily are sent out from the Tom's Run mines, to compete successfully in distant markets with coal from the same region mined at 3½c. The plea of the proprietors of the Tom's Run pits is a specious one. The mines were not ready to ship coal when arbitration was in progress and the umpire's award made, "So," say the owners, "we are not bound to abide by arbitration." But so soon as the umpire was heard from, the Tom's Run pits were started up and have been running 50 and 60 cars daily, tributary to the Pittsburg & Lake Erie Railroad. The rest of the operators naturally feel sore over this, but as yet have been powerless to help matters. Neither has the Miners' Union been able to prevent miners from gladly accepting work at 3 cents. With defection from arbitration on both sides the fence, it is hard to tell what good is to permanently result from this method of adjusting prices for digging. The Buena Vista troubles are growing more complex. A score of strikers were arrested and bailed for a hearing on a charge of conspiracy last week. To-day, twenty-two more were arrested on a charge of damages to the business of the company operating the Buena Vista pits. This trouble is the direct outgrowth of a disregard of the umpire's award in the Buena Vista works on the Baltimore & Ohio Railroad. A strike ensued, and the strikers, with the usual accompaniment of drums and fifes, have been "making it pleasant" for the men who took their places. The sympathy of other operators seems to be with the strikers.

Mill demand continues fair to middling, with increased complaint among coal men of the encroachment of natural gas as a mill fuel.

River affairs are undergoing their midwinter hibernating. Prices below, though firmer, are at low ebb, owing to large stocks and restricted industrial demand. Very few pits on the river are at work, the exception being firms who can provide their diggers with all-the-year round work. A little river coal is coming from the lower pools for supplying "floats" at the mouth of the rivers, but navigation being practically suspended and the river pits pretty well ice-locked, the river trade furnishes no material for a letter.

Coke is reported a trifle better in feeling, with no change in prices, which remain at $1@$1.25, Crushed, $1.75 per ton, free on board. Rumors of a coke syndicate for regulating output and prices crop out afresh, but you can safely state that there is no real basis for such stories. Demand is reported improving, and prospects for further betterment rather rosy than otherwise. Daily consumption is placed at 600 cars.

Buffalo. January 24.

[From our Special Correspondent.]

This letter will be short, the absence of any items of general interest being the cause.

The topic of the proposed soft coal pool is the principal subject discussed among the trade. The situation may be briefly described as follows: The railroads and private bituminous coal producers and shippers doing business in the Buffalo market have decided to attempt to pool. For years past, they claim that soft coal has been sold at ruinous prices, owing to competition. The railroads interested are the Erie, the Buffalo, New York & Philadelphia, the Rochester & Pittsburg, and the Alleghany Valley. If the pool is formed, it will, of course, include the firm of Bell, Lewis & Yates, the Hamilton Coal Company, and all others bringing coal to the Buffalo market. The call has been sent out by Galusha A. Grow. All producers of bituminous coal for this market are requested to meet at Victoria Hotel, corner of Twenty-seventh street and Eighth avenue, New York, on January 24th. The call states that the object of the meeting is for the consideration of the state of the market for bituminous coal and its annual production, in connection with representatives of the railroads. The agents of some of the large coal companies were seen yesterday, and there seems to be a general feeling in favor of forming a pool, provided satisfactory percentages can be arranged, and all the producers and the railroads will go in.

The schedule of prices for hard and soft coal and coke is nominally unchanged. Business is fairly active, especially for family trade.

The local newspapers a few days since, gave the following statement, which may be of interest to your readers, although I am not posted as to the reliability of the figures:

SHIPMENTS OF COAL FROM BUFFALO.

Anthracite.

	Tons.
R. R. Hefford's docks	119,392
Pennsylvania Coal Company's docks	160,832
J. Langdon & Co. (Erie Basin docks)	9,261
Lehigh Valley Coal Company's docks	291,536
Delaware & Hudson Canal Company's docks	139,429
New York, Lake Erie & Western Railroad Company's docks	185,360
Buffalo, New York & Philadelphia Railroad Company's docks	173,600
Delaware, Lackawanna & Western Railroad Company's docks	368,368
Total anthracite	1,467,778

Blossburg.

Delaware, Lackawanna & Western Railroad Company's docks	20,000
J. Langdon & Co. (Erie Basin) docks	4,000
Others	2,000
Total Blossburg	26,000

Bituminous.

Bell Lewis & Yates's docks	7,610
Grand total	1,497,388

You will notice there is an error in the footings, or else in the figures in detail.

The last annual report of the Buffalo, New York &

Philadelphia Railroad Company has just been published. The traffic for a long time has been largely in excess of the accommodations provided. The business of the road next year would be at least 200 per cent greater than the past year if the supply of cars was adequate to handle the freight offered.

The report further states that the coal moved over its line in 1883 was 1,367,798 tons, as compared with 1,467,177 tons in 1882—a decrease in 1883 of 99,384 tons. This decrease was caused "by a strike of miners in the bituminous coal region, and by want of adequate facilities in Buffalo for handling all the anthracite offered." The company owns 425,000 shares of the Northwestern Coal and Iron Company's first mortgage bonds. The company should expend $300,000 for "improvements on land in Buffalo (85 acres) owned by the company for shipping and storing anthracite coal to the capacity of 400,000 tons per annum."

Chicago. January 23.

[From our Special Correspondent.]

There has been no change whatever in the situation of the anthracite market since my last week's review. Dullness—and, for this season of the year, and under such favorable weather for the coal trade, a surprising dullness—is still the prevailing feature. Orders from the country come in very slowly, and for small amounts. "The country retailers act as if they were afraid of coal, or as if they looked for a decline in prices very soon," said one shipper to-day. Orders for five and ten-ton lots are thought large now, the shipper being satisfied if he receives a fair number of one and two-ton orders. Travelers throughout the Northwest state that the yards are not so full of coal as is generally supposed, but the feeling among the trade is decidedly adverse to ordering ahead of immediate necessities. Coal is coming forward freely, and the prospect of a goodly surplus with the opening of spring is not at all slim. Circular rates are shaded very generally, the efforts of some of the dealers and a local but unreliable newspaper to the contrary notwithstanding. Invoices speak louder and more forcibly than the protestations of that class of the trade which believes that the interests of the market are subserved by giving out false reports. The plain truth is, that the anthracite coal trade is in a weak and semi-demoralized condition, and all who know any thing about it know this. Go into the offices of these dealers who talk big trade and full circular rates, with cash in hand, and the truth of the matter instantly becomes apparent. "What is the use of a circular under the present conditions?" is a question which your correspondent can not answer any more than those who ask it.

Circular rates remain as follows:

PER NET TON BY CAR-LOAD.

Grate	$6.29
Egg	6.47
Range	6.74
Chestnut	6.87
Lehigh lump	7.68
Wilkes-Barre lump	6.72
Pittston lump	6.72

While practically the same condition of things noted above is true also of the market for bituminous coals, there is not quite so much weakness, and quoted prices are more nearly adhered to. The demand for Erie, Indiana Block, and Hocking Valley coals is fair, and the supply ample. The Hocking Valley fight—if rumor is worth any thing—promises to break out again soon, though all is quiet now and sales are made at quoted rates, $3.60, ten off. A moderate inquiry is reported for Wilmington, Morris, and Streator coals, and sales are made at quoted figures. No difficulty is reported in obtaining ample transportation facilities from the Illinois mines, and most of the standard mines are running up to their full capacity. We quote prices as follows:

Erie and Brier Hill	$4.75@$5.25
Winifrede	@ 4.50
Pittsburg	3.75@ 4.00
Indiana Block	3.00@ 3.25
" Slack	1.50@ 1.75
" Nut	1.75@ 2.00
Baltimore & Ohio	@ 3.60
Hocking Valley	@ 3.60
Youghiogheny	4.00@ ....
Wilmington	2.60@ 2.75
Blossburg	@ 4.15
Cumberland Smithing	@ 4.00
Sonman "	@ 4.00
Kinkaid Lump	@ 3.60
Grape Creek	2.30@ ....
Fountain County	2.35@ 2.50
Clinton Lump	@ 2.30
Streator	2.25@ 2.35
Minonk	@ 2.50
Morris	@ 2.50

Coke is in fair demand for small lots, and prices are held with a fair degree of firmness. Connellsville is selling at $5@$5.10, and Crushed Coke at $5.70@$6.

Boston. January 25.

[From our Special Correspondent.]

The improved feeling in the anthracite branch of the market has continued this week. There has been considerable inquiry, and more orders have been placed. Prices are firmly held, and parties who would not buy two weeks ago at $4.15 for stove have paid $4.40 this week. There continues to be very little trade at Philadelphia. There is not a pressing amount of coal reported there, and no special inducements are offered to trade. Captains continue to avoid Philadelphia on account of ice in the Delaware. At New York, the f. o. b. prices are still $4.40 for stove, $3.85 for broken, and $3.95 for egg. It now looks as if these figures would be maintained if there is fair winter weather.

Bituminous trade is very quiet. The recent Fitchburg contract is said to have been taken at about $2.75 f. o. b. at Baltimore. Considerable Clearfield coal was shipped from Baltimore last season, and this looks as if the Pennsylvania road would continue to make low tolls to Baltimore where necessary. There is still talk of bituminous contracts being placed earlier than usual. Most of the shippers have little or nothing to do just now, and there is plenty of time to talk up business. There seems to be no special reason why manufacturers or the railroad should enter the market early this year. There are no signs of an agreement or understanding between Cumberland and Clearfield interests, and, unless something in this line is accomplished, very low figures will rule all the season. How long the Kilkenny system of competition will go on between these companies is mere conjecture. The anthracite companies would like very much to see something like harmony among the bituminous brethren. Unless this does come about, there is not a very flattering prospect for broken coal with manufacturers.

Freights are not materially changed, continuing low for this season.

New York, $1.10@$1.25 per ton; Philadelphia, $1.50@$1.60; Baltimore, $1.60@$1.70; Georgetown, $1.70@$1.75; Newport News, $1.65; Richmond, $1.70; Bay of Fundy, $1.60@$1.65; Cape Breton, $2.25.

Retail trade continues moderately active. Dealers would like an advance, in view of the wholesale advance, but none can be made, as stocks were put on at lower figures; and as there is little or no cohesion to the retail trade, there will be no advance until it is forced upon them by the actual cost of coal.

White ash, furnace, egg, and nut	$5.75
" " stove	6.00@6.25
Red ash, egg	6.25
" " stove	6.50
Lorberry, egg and stove	6.50@6.75
Franklin, egg and stove	7.00
Lehigh, furnace, egg, and stove	6.00@6.25
"	6.00

STATISTICS OF COAL PRODUCTION.

Belvidere-Delaware Railroad Report for the week ended January 19th:

	Week.	Year. 1884.	Year 1883.
Coal for shipment at Coal Port (Trenton)	.....	.....	125
Coal for shipment at South Amboy	5,584	17,748	46,159
Coal for distribution	15,909	36,821	45,113
Coal for company's use	4,251	12,548	9,175
Total	25,744	67,117	100,572
Increase	.....	.....	.....
Decrease	.....	33,455	.....

The decrease in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 8,139 tons, as compared with the corresponding period in 1883.

Comparative statement of the production of anthracite coal for the week ended January 19th, and year from January 1st:

TONS OF 2240 LBS.	1884. Week.	1884. Year.	1883. Week.	1883. Year.
Wyoming Region.				
D. & H. Canal Co.	54,080	105,345	41,327	184,025
D. L. & W. RR. Co.	71,325	189,195	64,691	229,102
Penna. Coal Co.	15,890	35,900	15,013	64,508
L. V. RR. Co.	29,267	60,409	7,864	59,537
P. & N. Y. RR. Co.	2,654	8,918	2,774	9,763
C. RR. of N. J.	.....	*	37,000	110,399
North & West Br. RR.	†	27,667	10,210	16,452
	173,216	427,434	178,879	673,786
Lehigh Region.				
L. V. RR. Co.	73,117	181,047	47,737	323,909
C. RR. of N. J.	.....	*	35,945	105,345
S. H. & W. B. RR.	†	6,215	.....	1,775
	73,117	187,262	83,682	431,029
Schuylkill Region.				
P. & R. RR. Co.	154,473	393,813	63,352	281,521
Shamokin & Lykens Val.	.....	*	16,991	52,228
	154,473	393,813	80,343	333,749
Sullivan Region.				
St Line&Sul.RR.Co.	1,445	3,842	927	3,344
Total	402,251	1,012,351	343,831	1,441,908
Increase	.....	.....	.....	.....
Decrease	.....	429,557	.....	.....

* Included in tonnage of the Philadelphia & Reading Railroad.

† Reports not received.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1879	1,023,703 tons
" " " 1880	1,256,053 "
" " " 1881	1,198 256 "
" " " 1882	1,315,828 "

Horsford's Acid Phosphate.

Assists Mental Labor.

Prof. ADOLPH OTT, New York, says of the Acid Phosphate: "I have been enabled to devote myself to hard mental labor, from shortly after breakfast till a late hour in the evening, without experiencing the slightest relaxation, and I would not now at any rate dispense with it."

DIVIDENDS.

QUINCY MINING COMPANY,

NEW YORK, Jan. 22, 1884.

DIVIDEND NO. 31.

Four dollars and fifty cents per share will be payable February 20th next, to registered holders 30th inst. Massachusetts holders will be paid at the office of Mr. N. H. Daniels, Transfer-Agent, 2 Change Avenue, Boston.

By order.

WM. ROGERS TODD, Treas.

ONTARIO SILVER MINING COMPANY,

MILLS BUILDING, 15 BROAD ST.,

NEW YORK, Jan. 21, 1884.

DIVIDEND NO. 91.

The regular monthly dividend of fifty cents per share has been declared for December, payable at the office of the company, San Francisco, or at the Transfer Agency in New York, on the 31st inst. Transfer-books close on the 25th inst.

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